DELAY ANALYSIS OF PACIFIC FLEET UNDERWAY REPLENISHMENTS

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THESIS

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ABSTRACT

An operational analysis of the delays incurred in Underway Replenishments of the Pacific Fleet, December, 1967 - April, 1969, is conducted. Twenty specific delays are analyzed from the UNREP data of which more than 80% was from UNREPs conducted in Southeast Asia by supply ships providing logistic support to naval units engaged in combat operations. Delay occurrence distributions are derived; delay time distributions are derived and tested for goodness-of-fit with the Kolmogorov-Smirnov test. Delay as a function of the following UNREP attributes is analyzed: supply ship class, receiver ship type, time: day or night, location: EASTPAC or WESTPAC, simultaneous receivers or a single receiver, delivery method, product delivered, length of supply ship deployment, and weather. Hypothesis testing of delay occurrence parameters for UNREP attributes is done, and causes of delays are discussed. A method, based on the use of conditional probabilities and Bayes' Theorem, of predicting a delay occurrence prior to an UNREP when the UNREP attributes are known is presented.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

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I. INTRODUCTION

In order to increase the effectiveness of the United States Navy and to carry out the Navy's mission, naval forces and fleet units must be capable of remaining at sea for prolonged periods. Fleet units receive logistic support by means of Underway Replenishment (UNREP) thus enabling them to operate at sea for prolonged periods. Without resupply of naval forces, sustained operations against an enemy would be impossible. The UNREP operation must be accomplished without interferring with the primary mission of the fleet units supplied [1], and with minimum increase in vulnerability of these units.

Considerable effort has been expended to reduce the total time to conduct an UNREP. Delays incurred during the replenishment operation extend the total replenishment time and thus in most cases are a deterrent to efficient Underway Replenishments. One method of increasing UNREP transfer rates (ratio of quantity transferred to transfer time) is to decrease delay time.

A. SOURCE OF DATA

The date used in this study was reported by the delivery ships in the UNREP operation to Commander Service Force, U. S. Pacific Fleet (COMSERVPAC) [2]. At the conclusion of each UNREP the delivery ship records and reports on various attributes and variables of the UNREP such as type and hull number of delivery ship and receiving ship,

date, day or night UNREP, Eastern Pacific (EASTPAC) or Western Pacific (WESTPAC) location, total time to conduct UNREP, time to transfer logistic supplies, types of delays incurred and time incurred by each delay, type of delivery method, product delivered, and various other UNREP characteristics.

The data used in this study covers all the UNREPs conducted in the Pacific Fleet during the time period December, 1967 through April, 1969. It is noteworthy that more than 80% of the UNREPs conducted during this time period were conducted in Southeast Asia by supply ships providing mobile logistic support to naval units engaged in combat operations against North Vietnam and enemy forces in the Republic of Vietnam. This 17 month period includes UNREPs in support of combat operations involved in part of the total bombing phase of North Vietnam, naval aerial bombardment of South Vietnam, gunfire support by naval units in the South China Sea, the Market Time operation by fleet units off the South Vietnam coast which was the interdiction operation against hostile infiltrating naval units, Amphibious landings and operations in support of ground forces, and other naval support operations. Consequently the data presented an excellent opportunity to analyze UNREP operations in a war tempo of naval operations.

Prior to analysis about 3% of the data submitted to COMSERVPAC had to be discarded due to errors present in the reported data.

B. DIVISION OF DATA

There are primarily two methods of conducting an UNREP. The first method is by the connected transfer of supplies from delivery ship to receiver ship through the use of transfer rigs and hoses. The second method is by the use of Vertical Replenishment (VERTREP) which involves the use of a helicopter to transfer supplies from the delivery ship to the receiving ship.

The data for this study was divided into three basic parts for analysis; these three parts were:

1. Solid data which represented the transfer of ammunition, provisions, and stores via connected transfer rigs.
2. Liquid data which represented the transfer of Navy Special Fuel Oil (NSFO), jet airplane fuel and diesel fuel (JP-5), and aviation gasoline (AVGAS) via connected hoses.
3. VERTREP data which represented the transfer of ammunition, provisions, and stores via helicopter.

The data used in this analysis represented 4609 Solid UNREPs, 8450 Liquid UNREPs, and 903 VERTREPs for a total of 13,962 replenishments.

C. DELAY DEFINITION

A delay is defined as any event or activity that extends the time necessary to transfer logistic supplies in addition to the time normally expended in transfer of logistic supplies. The primary purpose of Underway Replenishment is the transfer of logistic supplies; hence, a delay is an interruption of that transfer process. There were 20 different

possible delays reported on by the delivery ships. The applicable delays are given in Table I. As shown in Table I, the delays used in the analysis have been very precisely defined by COMSERVPAC [2]. The commonly held definition of delay describes a detrimental quality. However, not all of the delays used in this analysis have that quality. It should be noted that five delays were necessary or productive activities which were Brass Transfer, Aircraft Engine Transfer, Movie Transfer, Personnel Transfer, and Water Transfer, and one delay, Adverse Weather, was an unavoidable activity. These activities are referred to as delays because they interrupt the transfer of logistic supplies.

D. THESIS OBJECTIVES

The first objective of this thesis is to determine the probability distribution of delay occurrences and the probability distribution of delay times.

The second objective is to investigate the attributes or characteristics of an UNREP that determine the delays of that UNREP. That is, investigate the functional equation

$$\text{Delay} = f(\text{UNREP attributes}).$$

The UNREP attributes used are delivery ship class, receiver ship type, time: day or night, receiver ship combination: simultaneous receiver ships or single receiver ship, location: EASTPAC or WESTPAC, product delivered, delivery method, weather, and length of delivery ship deployment. After investigating these relationships, an attempt to delineate causes of delays will be made.

Table I

Delays Used in Analysis

Delay Code	Delay Used	Applicable to Solid UNREPs	Applicable to Liquid UNREPs	Applicable to VERTREPs
AW	Adverse Weather	X	X	X
AR	Additional Requirement Request	X	X	X
BO	Breakout	X		X
BT	Brass Transfer	X	X	
ET	Aircraft Engine Transfer	X		
HC	Hose Coupling Failure		X	
LA	Personnel in Landing Area			X
MT	Movie Transfer	X	X	X
NA	Non-acceptance of Appropriate Rigs	X	X	
NL	Inadequate Night Lighting	X		X
NR	Net Return Delay	X		X
PT	Personnel Transfer	X	X	X
RC	Rig Casualty	X	X	
RS	Waiting For Receipt Signatures	X	X	X
SD	Incorrect Station Data	X	X	
SK	Station Keeping or Approach	X	X	
SS	Receiving Station Saturation	X		X
VT	JP-5 Visual Acceptance Tests		X	
WT	Water Transfer	X	X	
OO	Other	X	X	X
	Total Number of Delays Possible	17	14	11

The third objective is to present a method of predicting the occurrence of a delay prior to an UNREP. This prediction method will be based on UNREP attributes and will be derived from the operational data analyzed in this thesis.

E. ASSUMPTIONS

The first assumption used in the analysis involves the assumed uniformity of reporting ships. The data represents reports made by 28 Solid delivery ships, 22 Liquid delivery ships, and 4 VERTREP delivery ships. The data is obtained from several different sources within the reporting ship and some of the data is estimated. The assumption that the various data reporters are using the same basis for their estimates and reports is made; i.e., it was assumed all reporting ships were reporting in a uniform manner. The following example illustrates the aspect of uniform reporting. Suppose an AE is transferring ammunition to a Destroyer via two transfer rigs, and in another UNREP an AOE is transferring ammunition to a Cruiser via two transfer rigs. Assume a Rig Casualty of some type develops on one transfer rig in each UNREP necessitating completion of each UNREP with only one transfer rig. Non-uniform reporting of data would allow different interpretations of this event; the AE might report a Rig Casualty delay, and the AOE might reason that since the UNREP was completed with one rig no delay existed. The assumption of uniform reporting by delivery ships means both delivery ships will report this event in the same way. Since the

overall time alongside was increased by the loss of one transfer rig, both ships would uniformly report a Rig Casualty delay.

The second assumption is that of continuous delay times. The method of reporting delay times prescribed by COMSERVPAC [2] involves a rounding to the nearest ten minutes and recording in ten minute increments in the cases of Solid and Liquid UNREPs. VERTREP delay times were rounded to the nearest five minutes and recorded in five minute increments. For this analysis, the assumption of continuous delay times was made since in reality the delay times are continuous.

II. DELAY DISTRIBUTIONS

Throughout the analysis of Underway Replenishment delays the following two questions are of importance. For any UNREP, did a delay occur? Given that a delay did occur, how much time was spent in that delay activity? Delay distributions are vital clues in answering these questions.

A. DELAY OCCURRENCE DISTRIBUTIONS

In an UNREP, a delay either occurs or does not occur. This phenomenon is described by the Bernoulli probability distribution with parameter p which is the probability that an UNREP has a delay. That is,

$$P(\text{UNREP has a delay}) = p.$$

When more than one UNREP is observed, say n UNREPs, i.e,

$$n = \text{number of UNREPs observed,}$$

and if x denotes the number of UNREPs observed that had delays, then the occurrence of delays is described by the Binomial probability mass function, given by f(x), where

$$f(x) = C(n,x)\, p^{x}(1-p)^{n-x}, \text{ and}$$

$$C(n,x) = \frac{n!}{x!\ (n-x)!}\ .$$

The Binomial probability distribution is described by the parameters n and p which in the case of delays occurring during an UNREP are as defined above.

To delineate the delay occurrence distributions, the data was subdivided by delivery ship class. Table II lists the Binomial parameters of the delay occurrence distributions, as estimated from the data.

Table II

Delay Occurrence Distribution Parameters

UNREP Data Subdivision	Binomial Parameters	
	n	p
Solid: All observations	4609	.5429
AE 3/12 Class	1289	.8410
AE 21/23 Class	662	.7749
AF Class	1209	.3805
AKS Class	653	.3614
AFS Class	240	.2167
AOE Class	556	.2824
Liquid: All observations	8450	.3843
AO 22/36/41 Class	4931	.4610
AO 105/(J) Class	1330	.3752
AO 143 Class	1410	.3121
AOE Class	779	.0449
VERTREP: All observations	903	.4795
AFS Class	650	.4569
AOE Class	253	.5375

In addition, the delay occurrence parameter p for each analyzed UNREP attribute is listed for Solid UNREPs in Table XV, for Liquid UNREPs in Table XVI, and for VERTREPs in Table XVII.

B. DELAY TIME DISTRIBUTIONS

The UNREP subdivisions, of delivery ship class, were maintained to determine the conditional delay time distribution given that a delay had occurred. The continuous delay times were grouped in discrete intervals, distribution statistics were compiled, and the frequency distributions were graphed in an effort to determine the type of distribution. The Kolmogorov-Smirnov test was used to test for the goodness of fit of the resulting distribution; see Appendix A for a discussion of this test. In the case of Solid UNREPs and Liquid UNREPs, delay times are rounded to the nearest ten minutes and recorded in ten minute increments. To derive the distributions, the continuous delay time distribution was grouped according to the following time intervals: 0-15, 15-25, 25-35, ... , and 145-155. Since the VERTREP delay times are recorded in five minute increments, it was necessary to group the continuous delay time distribution in the following time intervals: 0-7.5, 7.5-12.5, 12.5-17.5, ... , and 72.5-77.5. All twelve of the conditional delay time distributions given that a delay had occurred during the UNREP were found to be of the Gamma probability distribution family, described by the density function $g(x;r, \lambda)$ where

$$g(x;r,\lambda) = \frac{\lambda^{r} x^{r-1} e^{-\lambda x}}{(r-1)!}, \text{ where } x > 0,\ r > 0,\ \lambda > 0.$$

If $r = 1$, the Gamma distribution is the Exponential distribution $f(x;\lambda)$, where

$$f(x;\lambda) = \lambda e^{-\lambda x}, \text{ and } x > 0.$$

Seven delay time distributions, as listed in Table III, were found to be Exponential distributions and passed the Kolmogorov-Smirnov test. The Exponential parameter λ used in solving for delay time distributions was estimated to be

$$\lambda = \frac{1}{\text{sample mean}} .$$

The distribution passes the test at a level of significance if the maximum observed sample deviation is less than the Kolmogorov-Smirnov test value at that level [3]. Appendix A discusses the meaning of the level of significance. The level of significance used on all distributions described in Table III was 5% except for the Solid AF Class which was 1%. In addition to the distributions described in Table III, the Liquid AO 22/36/41 Class delay time distribution was judged to be an Exponential distribution, but the fit of the distribution was not sufficient to pass the Kolmogorov-Smirnov test.

The remaining four delay time distributions were found to be Gamma distributions. The closed form of the cumulative distribution function does not exist for the Gamma distribution when r is not an integer; so, Simpson's Rule was used to numerically integrate the Gamma distribution. The mean and variance of the Gamma distribution are:

$$\text{Mean} = r/\lambda \ ,$$

$$\text{Var} = r/\lambda^2 .$$

Using the method of moments to estimate the Gamma parameters: r, the shape parameter is estimated as

Table III

Exponential Delay Time Distributions

Delivery Ship Class	Distribution Sample Mean	Exponential Parameter λ	Kolmogorov Smirnov Test Value	Maximum Observed Deviation
VERTREP AOE	29.1912	.0343	.1202	.0722
Liquid AO 105/(J)	24.3359	.0411	.0602	.0518
Liquid AO 143	31.2695	.0320	.0645	.0481
Liquid AOE	63.0555	.0159	.2367	.1171
Solid AKS	16.3136	.0613	.0885	.0550
Solid AFS	23.7500	.0421	.1834	.0932
Solid AF	19.6529	.0509	.0668	.0665

Table IV

Gamma Delay Time Distributions

Delivery Ship Class	Observed Sample Mean	Observed Sample Variance	Gamma Parameters		Kolmogorov Smirnov Test Value	Maximum Observed Deviation
			r	λ		
Solid AOE	37.1519	564.439	2.4454	.0658	.1082	.0585
Solid AE 21/23	31.7510	725.563	1.3894	.0438	.0722	.0616
VERTREP AFS	19.4175	305.979	1.2322	.0635	.0935	.0881

$$r = \frac{(\text{Mean})^2}{\text{Var}} \text{ , and}$$

λ the scale parameter is estimated as

$$\lambda = \frac{\text{Mean}}{\text{Var}} .$$

Using the observed sample mean and observed sample variance to determine the Gamma parameters, the three distributions listed in Table IV were found to be Gamma distributions and passed the Kolmogorov-Smirnov test at a 5% level of significance for the Solid AOE Class distribution and a 1% level of significance for the other distributions. In addition to the distributions listed in Table IV, the Solid AE 3/12 Class delay time distribution was judged to be a Gamma distribution; however, the fit was not sufficient to pass the Kolmogorov-Smirnov test.

III. DELAY AS A FUNCTION OF UNREP ATTRIBUTES

Initially gross delay statistics were compiled for Solid, Liquid, and VERTREP delays and then delays were analyzed for each of the UNREP attributes in order to investigate the relationship Delay = f(UNREP attributes).

A. GROSS SOLID, LIQUID, AND VERTREP DELAYS

Table V is a compilation of the gross delay statistics for Solid cargo. Initially it appears noteworthy that 54% of the UNREPs had delays and 21% total alongside time was spent in delay. However, 58% of the total delays and 65% of total delay time was spent in the following unavoidable or necessary activities: Adverse Weather, Brass Transfer, Engine Transfer, Movie Transfer, Personnel Transfer, and Water Transfer.

Ten percent of total alongside time for solid transfers was spent in the Brass Transfer delay. This delay is a result of the transfer of used and empty ordnance shell cases from combatant ships to the supply ship for further transfer to an inport receiving activity. This unusually large amount of time spent in this activity suggests that present provisions for handling of brass are not adequate. In the past, provisions for handling and stowage of brass on both combatant and supply ships have been of the temporary and makeshift type. An example of this is the fact that on both combatant and supply ships no permanent stowage facilities are available for brass. Provisions on supply ships and

Table V

Delay Analysis For Solid Cargo

Delay Code	No. of Delays	PC Total Delays of this type	Delay Time (Mins.)	PC Total Delay Time Due to This Delay
AW	155	4.59	3270	4.11
AR	129	3.82	1810	2.28
BO	51	1.51	1380	1.73
BT	1343	39.76	39950	50.23
ET	15	0.44	480	0.60
MT	215	6.36	2470	3.11
NA	17	0.50	230	0.29
NL	31	0.92	350	0.44
NR	113	3.35	1290	1.62
PT	231	6.84	5090	6.40
RC	304	9.00	7320	9.20
RS	26	0.77	310	0.39
SD	14	0.41	270	0.34
SK	158	4.68	2190	2.75
SS	132	3.91	2640	3.32
WT	14	0.41	510	0.64
OO	430	12.73	9980	12.55
Total	3378		79540	

Total No. of UNREPS =	4609
No. of UNREPs Having Delays =	2502
PC UNREPs Having Delays =	54.29
Total Alongside Time =	384143
PC Alongside Time Spent in Delay =	20.71

combatant ships should be provided to handle and store brass in order to decrease the amount of delay time spent in this activity.

Delay statistics for Liquid Cargo are given in Table VI. 38% of the UNREPs had delays and 17% of total alongside time was spent in delay. 48% of the total delays and 54% of the total delay time was spent in the following unavoidable or necessary activities: Adverse Weather, Brass Transfer, Movie Transfer, Personnel Transfer, and Water Transfer. The Brass Transfer delay, as in the case of Solid delays, accounts for a large amount of total alongside time: 5.5%. Over one fourth of the total delays and more than one fourth of total delay time falls into the Other category; these figures suggest that more delays need to be delineated and added to the list of possible Liquid Delays.

Gross VERTREP delays are shown in Table VII. The largest delay, Delay in Net Return (NR Delay), is a conglomeration of many problems on the receiving ships such as: delay in clearing the landing area of cargo, delay in strikedown of cargo, delay in removing cargo from nets, and delay in consolidating nets for return to the supply ship. Return of nets is the last event that occurs in the VERTREP operation, and these other activities accumulate and appear in the NR Delay. The Waiting for Receipt Signatures Delay (RS Delay) appears as zero delays in Table VII. The RS Delay is probably also accounted for in the NR Delay since Receipt Signatures are normally returned with nets. The reason for zero delays due to Inadequate Night Lighting is probably due to the reluctance of pilots to attempt night VERTREP without sufficient lighting.

Table VI

Delay Analysis For Liquid Cargo

Delay Code	No. of Delays	PC Total Delays of this type	Delay Time (Mins.)	PC Total Delay Time Due to This Delay
AW	161	3.78	2980	2.78
AR	239	5.61	4810	4.49
BT	902	21.16	35250	32.89
HC	99	2.32	2390	2.23
MT	182	4.27	2120	1.98
NA	21	0.49	810	0.76
PT	639	14.99	12870	12.01
RC	285	6.69	7210	6.73
RS	34	0.80	370	0.35
SD	15	0.35	330	0.31
SK	264	6.19	3620	3.38
VT	33	0.77	560	0.52
WT	181	4.25	5150	4.80
OO	1208	28.34	28720	26.79
Total	4263		107190	

Total No. of UNREPs =	8450
No. of UNREPs Having Delays =	3247
PC UNREPs Having Delays =	38.43
Total Alongside Time =	637948
PC Alongside Time Spent in Delay =	16.80

Table VII

Delay Analysis For VERTREP Cargo

Delay Code	No. of Delays	PC Total Delays of this type	Delay Time (Mins.)	PC Total Delay Time Due to This Delay
AW	15	2.16	225	2.26
AR	37	5.33	625	6.27
BO	48	6.92	695	6.97
LA	6	0.86	40	0.40
MT	21	3.03	230	2.31
NL	0	0.0	0	0.0
NR	271	39.05	3990	40.04
PT	72	10.37	725	7.28
RS	0	0.0	0	0.0
SS	51	7.35	685	6.87
OO	173	24.93	2750	27.60
Total	694		9965	

Total No. of UNREPs =	903
No. of UNREPs Having Delays =	433
PC UNREPs Having Delays =	47.95
Total Alongside Time =	53570
PC Alongside Time Spent in Delay =	18.60

As in the case of Liquid delays, the Other delay accounts for one fourth of all delays and more than one fourth total delay time. One delay that is missing is a Helicopter Refueling delay; it would be appropriate to add such a delay to possible VERTREP delays since VERTREPs are often interrupted while refueling a helicopter. In addition, there is no delay for malfunction and repair of the helicopter; such a delay would be similar to the Rig Casualty delay for Solid and Liquid delays. Also, Brass is sometimes transferred via VERTREP, and there is no corresponding Brass Transfer delay available in the list of possible VERTREP delays.

B. DELIVERY SHIP CLASS TO RECEIVER SHIP TYPE

To analyze the UNREP attributes of Delivery Ship Class and Receiver Ship Type the UNREP data was grouped into subdivisions corresponding to possible Delivery Ship to Receiver Ship combinations. The following four Receiver Ship types were used:

1. Carrier
2. Cruiser and Battleship
3. Destroyer
4. Non-combatants: All other types.

1. Solid Delays

The following six Delivery Ship Classes were used in the analysis:

a. Ammunition Ship: AE 3 and 12 Classes
b. Ammunition Ship: AE 21 and 23 Classes
c. Refrigerated Store Ship: AF
d. Stores Issue Ship: AKS
e. Combat Store Ship: AFS
f. Fast Combat Support Ship: AOE.

Using the six classes of Delivery Ships and four types of Receiver Ships there were 24 possible combinations available. The delay analysis for each combination is given in Appendix B, Tables XVIII through XLI. Table VIII is a brief summary of some of the data for Solid Delays.

Table VIII

Solid Delays by Delivery Ship Class

Delivery Ship	Percent UNREPs Having Delays	Percent Alongside Time Spent in Delay
All Solid Ships	54.29	20.71
AE 3/12	84.10	28.43
AE 21/23	77.49	24.44
AF	38.05	13.89
AKS	36.14	14.38
AFS	21.67	8.98
AOE	28.29	9.90

Table VIII shows a progression from a large percentage of delay occurrences and alongside time spent in delay by the two AE ship classes to a small percentage of the same quantities for the AFS and AOE ship classes. The AE 3/12 class is predominantly composed of older ships than the other Delivery Ship classes. It is reasonable to expect more delays from these older ships due to their more numerous maintenance and repair problems and their outmoded replenishment designs. An example of this is the high percentage of Rig Casualty delays that can be seen in this group when compared with the other groups as shown in Tables XVIII through XLI. These facts, when taken together with the

fact that most of the Brass Transfer delays were accounted for in this and the AE 21/23 class, explain the high percentage of delays in these two groups. On the other end of the spectrum are the AFS and AOE classes. Both of these classes are relatively new (first commissioned in 1964) multi-product logistic ships with many UNREP design improvements over previous ships. The small percentage of delays and delay time is reasonable due to their improved UNREP techniques and equipment.

2. Liquid Delays

The Liquid Delivery Ships were grouped as follows:

a. Oiler: AO 22, 36, and 41 Classes
b. Oiler: AO 105 or Jumbo Class
c. Oiler: AO 143 Class
d. Fast Combat Support Ship: AOE

The delay analysis for each combination of Delivery Ship Class to Receiver Ship type is given in Tables XLII through LVII. Table IX shows comparative data for Liquid Delivery Ship Classes. Here again the progression from older ships with a high percentage of delays to the newer

Table IX

Liquid Delays by Delivery Ship Class

Delivery Ship	Percent UNREPs Having Delays	Percent Alongside Time Spent in Delay
All Liquid Ships	38.43	16.80
AO 22/36/41	46.10	20.44
AO 105/(J)	37.52	14.57
AO 143	31.21	14.28
AOE	4.49	3.22

ships with a small percentage of delays was clearly seen. From the oldest AO 22 Class to the AO 105 Class (commissioned in 1944) to the AO 143 Class (commissioned in 1954) and to the newest class: AOE (commissioned in 1964) there was a steady progression of less delays. The newest class, AOE, had one tenth the percentage of delays and about one sixth the percentage of alongside time spent in delay as the oldest class.

3. VERTREP Delays

The VERTREP Delivery Ships were the Combat Store Ship, AFS, and the Fast Combat Support Ship, AOE. The eight possible Delivery Ship Class to Receiver Ship Type combinations are given in Tables LVIII through LXV. Table X lists comparative data for VERTREP transfers.

Table X

VERTREP Delays by Delivery Ship Class

Delivery Ship	Percent VERTREPs Having Delays	Percent Alongside Time Spent in Delay
All VERTREP Ships	47.95	18.60
AFS	45.69	21.00
AOE	53.75	15.87

The Net Return delay and Other delay are the largest two delay activities in all four AFS to Receiver Type combinations. However, the AOE to Receiver Type combinations reflect various different delays with the greatest amount of delay activity; the Receiving Station Saturation delay being quite large in three of the four possible combinations. VERTREP

is a relatively new method of transfer in comparison to the method of connected transfer. As VERTREP becomes more widely used in the Fleet it is expected that delay activity will decrease.

C. TIME OF UNREP: DAY OR NIGHT

The UNREP delays were analyzed according to the time of the UNREP; i.e., either day or night. A hypothesis held prior to this analysis was that considerably more delay activity would occur at night than during the day. Both Besecker [4] and Aardal [5] have previously shown that night UNREP operations consistently take longer than those conducted in the day. Replenishment procedures for night operations as prescribed by the Office of the Chief of Naval Operations state, "Replenishments proceed more slowly and cautiously at night than during daytime. Operations that may be straightforward in daylight - approach, maintaining station, passing and tending rigs - become more difficult and complicated during darkness" [1].

Tables LXVI, LXVII, and LXVIII show the Day/Night delay statistics for Solid UNREPs, Liquid UNREPs, and VERTREPs respectively. This data is summarized in Table XI.

Table XI

Day/Night Delay Statistics

Type of UNREP	Percent UNREPs Having Delays		Percent Alongside Time Spent in Delay	
	Day	Night	Day	Night
Solid	52.70	58.21	20.72	20.68
Liquid	36.13	43.78	15.40	19.61
VERTREP	45.84	68.24	17.78	22.10

Surprisingly little difference was noted between day and night delay activity, particularly in delay time comparisons. Perhaps the reason for this is that fleet units have become more conscious of UNREP difficulties during nighttime operations and have increased their planning and preparations for nighttime UNREPs thus decreasing delay activity at night.

D. LOCATION OF UNREP: EASTPAC or WESTPAC

EASTPAC versus WESTPAC delays were analyzed with the results as shown in Table LXIX for Solid UNREPs and Table LXX for Liquid UNREPs. There were no VERTREPs conducted in EASTPAC that were reported on by delivery ships.

Both Solid and Liquid UNREPs reflected more delay activity proportionally in WESTPAC than in EASTPAC. A large number of training operations are conducted in EASTPAC. Many of these training operations involve only connections of rigs and passing dummy loads between delivery and receiver ships. The large proportion of Rig Casualty delays for Solid EASTPAC UNREPs is understandable due to these reasons. Since some of these training operations do not involve a complete replenishment operation, it is reasonable to expect fewer delays than occur during a complete replenishment procedure such as is usually conducted in WESTPAC.

E. NUMBER OF RECEIVING SHIPS: SIMULTANEOUS RECEIVERS OR A SINGLE RECEIVER

In the case of Solid or Liquid UNREPs, supply ships may replenish one ship at a time from either port or starboard side, or the supply ship may simultaneously replenish ships from both sides of the supply ship. VERTREP may be conducted to a single ship or a delivery ship may simultaneously conduct VERTREP to two or more ships. Delay analysis for simultaneous receivers or a single receiver is shown in Table LXXI for Solid UNREPs, Table LXXII for Liquid UNREPs, and Table LXXIII for VERTREPs.

The prior hypothesis held in the case of this analysis was that simultaneous receivers would reflect more delay activity than a single receiver due to more ships being involved in the operation, and a larger amount of the delivery ships crew and equipment would be in use for the replenishment. Exactly the opposite result came out of the analysis; i.e., more delay activity results from single receiver ship UNREPs than from simultaneous receiver ships being replenished. The largest difference in delay time was for Liquid UNREPs where 8.89% more alongside time was spent in delay for single receiver than for simultaneous receiver UNREPs.

The hypothesized reason for these unexpected results is as follows. The overall efficiency of an UNREP is directly proportional to the thoroughness of the planning phase. Even in the case of small or one product UNREPs, thorough planning is required [1]. It is believed

that planning for UNREPs has been concentrated toward simultaneous UNREPs and is lacking in the case of many single UNREPs. In addition many single UNREPs, particularly in the case of Liquid transfers, have been conducted during the time period for which data was available as a result of a chance meeting between a supply and a receiver ship. These unscheduled UNREPs, due to the lack of time available, had little or no planning prior to the actual UNREP. Thus, it appears that the lack of planning for single receiver UNREPs has resulted in increasing amounts of delay activity.

F. DELIVERY METHOD

Delay as a function of delivery method was analyzed. Delivery methods analyzed included type of rig for Solid transfers, hose type for Liquid transfers, and number of helicopters and range of transfer for VERTREPs.

1. Solid UNREPs-Type of Rig

The following transfer rigs were used in this analysis:

a. Burton
b. Double Burton
c. Drouge
d. Modified Housefall
e. Housefall
f. Double Housefall
g. Manila Highline
h. Wire Highline
i. Fast
j. Ram Tensioned Highline
k. Combination of two different rigs
l. Combination of three or more different rigs

The results of the analysis are given in Table LXXIV. Rigs showing the greatest amount of delay activity were the Modified Housefall due primarily to transferring 50% of the total Brass Transfer Delay and the combinations of two different rigs or three different rigs.

2. Liquid UNREPs-Hose Type

Types of transfer hose used in this analysis shown in Table LXXV were:

a. Seven inch hose without probe
b. Seven inch hose with probe
c. Six inch hose without probe
d. Six inch hose with probe
e. Four inch hose
f. Two inch hose
g. Combination of two different hoses
h. Combination of three different hoses

The largest amount of delay activity was in the four inch and two inch hose categories. These hose types reflect transfers to the smaller and older Destroyers and Non-combatants; hence, the reason for increased delay activity.

3. VERTREPs-Helicopters and Range

The number of helicopters used in the VERTREP and the range from delivery ship to receiver ship were analyzed as shown in Table LXXVI. The possible combinations were:

a. One helicopter; range less than 500 yards
b. One helicopter; range between 500 and 2000 yards
c. One helicopter; range greater than 2000 yards
d. Two helicopters; range less than 500 yards
e. Two helicopters; range between 500 and 2000 yards
f. Two helicopters; range greater than 2000 yards

The results show that VERTREP delay activity is more a function of delivery range than of the number of helicopters used in transfer. The greater the range, the more delay activity experienced on a percentage basis; i.e., the percentage of alongside time spent in delay increases at the larger ranges.

G. PRODUCT DELIVERED

To determine if delay activity varied with product delivered, a product delay analysis was conducted.

1. Solid UNREPs

The products transferred as shown in Table LXXVII were:

a. Ammunition
b. Provisions
c. General Stores
d. Ammunition, Provisions, and General Stores
e. Ammunition and Provisions
f. Ammunition and General Stores
g. Provisions and General Stores

Ammunition delivered singly accounted for twice the percentage of alongside time spent in delay when compared with any other category. This was primarily a reflection of the Brass Transfer Delay since 95% of Brass Transfer delay time was accounted for when Ammunition was transferred individually.

2. Liquid UNREPs

The following product delivered categories were possible:

a. NSFO
b. JP-5
c. AVGAS
d. NSFO, JP-5, and AVGAS

e. NSFO and JP-5
f. NSFO and AVGAS
g. JP-5 and AVGAS

The results of the analysis are shown in Table LXXVIII. More delay activity was observed proportionally when NSFO or JP-5 were delivered singly than any of the other possibilities. The NSFO and JP-5 products delivered singly included most of the transfers to the smaller Destroyer and Non-combatant type ships.

3. VERTREPs

The possible products to be delivered were:

a. Ammunition
b. Provisions
c. General Stores
d. Ammunition, Provisions, and General Stores
e. Either Ammunition and Provisions or Ammunition and General Stores (observed together due to the small number of transfers of the latter group)
f. Provisions and General Stores

The results of this analysis are shown in Table LXXIX. Less variation in delay activity for product delivered was observed in VERTREPs than either Solid or Liquid UNREPs.

H. LENGTH OF DEPLOYMENT OF DELIVERY SHIP

The variation of delay activity as a function of the length of supply ship deployment was investigated. The hypothesis held prior to the investigation was that the delay activity of a supply ship would vary from month to month when viewing the entire deployment of that ship. That is, the delay activity of the first month of deployment versus the second month of deployment versus the third month of deployment and so forth would show some type of recognizable pattern of variations.

It was necessary to use the assumption of an average deployment length of seven months for those ships on deployment in December, 1967 since exact information on deployment length was not available for those ships. This assumption was of the same average deployment length as observed for the other ships analyzed throughout the 17 month time period.

All 54 Delivery Ships were investigated separately and then grouped together in the 12 Solid, Liquid, and VERTREP Delivery Ship Classes for analysis.

The investigation revealed no discernible pattern of delay activity in any of the Delivery Ship Classes. Only random variations in delay activity emerged with small variations from month to month. The conclusion reached was that no identifiable pattern of delay activity exists for the length of deployment of Delivery Ship for the ships observed. An example of this investigation for one Delivery Ship Class, the Solid AE 3/12 Class, is given in Table LXXX.

I. WEATHER

It was expected prior to conducting the analysis that delay activity would vary with the weather. A reasonable expectation was that the more adverse the weather the greater the delay activity. Unfortunately there is no variable included in the data that directly reflects the state of the weather. The Adverse Weather Delay is available for the three types of replenishments, but it only accounts for delays

directly attributable to the weather, and it was used for less than 5% of the total delays in all three types of replenishments. Experience in WESTPAC operations had indicated adverse weather conditions for a much greater percentage of the time period available.

Connecting weather with a month of the year was investigated to determine if delay activity varied with the weather. It was thought that examining the delay activity of January versus June versus December and so forth, for WESTPAC UNREPs might yield a variation of delays that could be attributed to the monthly weather pattern present in the WESTPAC operating areas.

No detectable pattern of delay activity emerged as a result of this analysis. Random variations were present from month to month, but nothing that could be connected with a weather pattern was recognizable. The conclusion of this analysis was that insufficient data existed to properly analyze delays as a function of the weather. The inclusion of a one digit sea state indicator in each UNREP report should be sufficient to analyze this question. An example of this analysis, for Liquid UNREPs, is shown in Table LXXXI.

J. HYPOTHESIS TESTING OF UNREP ATTRIBUTE PARAMETERS

Statistical tests of the delay occurrence parameter p were conducted for the various UNREP attributes to determine if the parameter estimated from the data analysis was the true binomial population parameter. Recall that

$$p = P(\text{UNREP has a delay}),$$

and the delay occurrence distributions are binomial probability distributions with

n = Number of UNREPs observed.

To test a hypothesis (denoted by H) against an alternative hypothesis (denoted by A), a critical or rejection region of size α must be specified, where α = P(Reject H | H is true). To test the hypothesis H: $p = p_o$ against the alternative hypothesis A: $p \neq p_o$, where p_o was the estimated delay occurrence parameter, a critical region of the following size was used: $\alpha = 0.05$.

The binomial distribution may be approximated by the normal distribution if the sample size is reasonable large [3]. A random sample of the distribution was observed, and the number of UNREPs observed that had delays occurring was denoted by x. Then using the normal approximation, the test statistic Z was computed where

$$Z_1 = \frac{(x-0.5)-np_o}{\sqrt{np_o(1-p_o)}}, \text{ for } x > np_o, \text{ and}$$

$$Z_2 = \frac{(x+0.5)-np_o}{\sqrt{np_o(1-p_o)}}, \text{ for } x < np_o.$$

Then the hypothesis H: $p = p_o$ was rejected if $Z_1 \geq Z_{1-\alpha/2}$ or if $Z_2 \leq Z_{\alpha/2}$, where $Z_{1-\alpha/2}$ and $Z_{\alpha/2}$ are the tabled values for the normal distribution and $Z_{1-\alpha/2} = Z_{.975} = 1.96$, and $Z_{\alpha/2} = Z_{.025} = -1.96$, [3].

The results of these tests are shown in Table XII for Solid UNREPs, Table XIII for Liquid UNREPs, and Table XIV for VERTREPs. In the case

of small sample sizes, the test was not made. The following abbreviations are used in these tables: $x > np_o$ denoted by GT, $X < np_o$ denoted by LT, accept hypothesis denoted by A, and reject hypothesis is denoted by R.

Acceptance of the hypothesis was made for all UNREP attributes except two Solid UNREP cases and one Liquid UNREP case. In these three cases of hypothesis rejection the test statistic Z would accept the hypothesis at a slightly larger significance level α.

Table XII

Solid UNREP Attribute Hypothesis Tests

Attribute	x	n	p_o	$x > np_o$ $x < np_o$	Z	Accept/ Reject
Delivery-Receiver Ship						
AE 3/12-Carrier	27	30	.8536	GT	.461	A
AE 3/12-Cruiser	29	30	.9176	GT	.645	A
AE 3/12-Destroyer	26	30	.8299	GT	.293	A
AE 3/12-Non-combatant	24	30	.7018	GT	.978	A
AE 21/23-Carrier	16	20	.7480	GT	.278	A
AE 21/23-Cruiser	17	20	.8125	GT	.143	A
AE 21/23-Destroyer	18	20	.7990	GT	.847	A
AE 21/23-Non-combatant	9	20	.4516	LT	.209	A
AF-Carrier	11	30	.3889	LT	-.063	A
AF-Cruiser	13	30	.3385	GT	.905	A
AF-Destroyer	11	30	.3484	GT	.018	A
AF-Non-combatant	11	30	.4322	LT	-.541	A
AKS-Carrier	11	20	.4898	GT	.315	A
AKS-Cruiser	5	20	.2687	LT	.064	A
AKS-Destroyer	6	20	.3220	LT	-.029	A
AKS-Non-combatant	8	20	.4091	LT	.145	A
AFS-Carrier	5	20	.2558	LT	.200	A
AFS-Destroyer	3	20	.1667	LT	.100	A
AFS-Non-combatant	6	20	.2370	GT	.400	A
AOE-Carrier	11	20	.5812	LT	-.056	A
AOE-Cruiser	6	20	.3617	LT	-.342	A
AOE-Destroyer	1	20	.1273	LT	-.702	A
Time of UNREP						
Day	34	50	.5270	GT	2.03	R
Night	22	50	.5821	LT	-1.89	A
Location of UNREP						
EASTPAC	8	25	.4257	LT	-.866	A
WESTPAC	31	50	.5455	GT	.914	A
Receiver Type						
Simultaneous	25	50	.4508	GT	.558	A
Single	28	50	.5911	LT	-.305	A
Delivery Method						
Burton Rig	16	30	.5205	GT	-.042	A
Drouge Rig	13	30	.4568	LT	-.075	A
Modified Housefall Rig	19	30	.6638	LT	-.160	A
Housefall Rig	19	30	.5622	GT	.602	A
Manila Highline Rig	6	30	.4038	LT	2.09	R
Wire Highline Rig	9	30	.2620	GT	.266	A
Two Different Rigs	18	30	.6506	LT	.390	A

Table XII - Continued

Product Delivered						
Ammunition	22	30	.7959	LT	-.624	A
Provisions	11	30	.3427	GT	.084	A
Stores	9	30	.3342	LT	-.204	A
Provisions & Stores	4	20	.1864	GT	-.131	A

Table XIII

Liquid UNREP Attribute Hypothesis Tests

Attribute	x	n	p_o	$x > np_o$ $x < np_o$	Z	Accept/ Reject
Delivery-Receiver Ship						
AO 22/36/41-Carrier	10	30	.3068	GT	.116	A
AO 22/36/41-Cruiser	15	30	.4448	GT	.425	A
AO 22/36/41-Destroyer	15	30	.4400	GT	.478	A
AO 22/36/41-Non-combatant	14	30	.5142	LT	-.338	A
AO 105-Carrier	7	30	.3280	LT	-.911	A
AO 105-Cruiser	11	30	.4167	LT	-.371	A
AO 105-Destroyer	14	30	.3426	GT	1.24	A
AO 105-Non-combatant	19	30	.5714	GT	.501	A
AO 143-Carrier	12	30	.3253	GT	.677	A
AO 143-Cruiser	18	30	.4935	GT	.984	A
AO 143-Destroyer	14	30	.2741	GT	2.16	R
AO 143-Non-combatant	17	30	.4909	GT	.647	A
AOE-Carrier	2	30	.0351	GT	.446	A
AOE-Cruiser	2	30	.1250	LT	-.691	A
AOE-Destroyer	1	30	.0381	LT	.341	A
AOE-Non-combatant	3	30	.1600	LT	-.647	A
Time of UNREP						
Day	21	50	.3613	GT	.720	A
Night	24	50	.4378	GT	.460	A
Location of UNREP						
EASTPAC	7	25	.2478	GT	.141	A
WESTPAC	25	50	.3936	GT	1.33	A
Receiver Type						
Simultaneous	15	50	.3247	LT	-.223	A
Single	26	50	.4602	GT	.709	A
Delivery Method						
7 in. Hose w/o probe	11	30	.3596	GT	-.110	A
7 in. Hose w probe	9	30	.3667	LT	-.567	A
6 in. Hose w/o probe	13	30	.4769	LT	-.295	A
6 in. Hose w probe	16	30	.3765	GT	1.58	A
4 in. Hose	15	30	.3366	GT	1.70	A
2 in. Hose	11	30	.5603	LT	-1.95	A
Two Different Hoses	15	30	.3514	GT	1.51	A
Product Delivered						
NSFO	16	30	.3634	GT	1.74	A
JP-5	10	30	.5250	LT	-1.92	A
NSFO, JP-5, & AVGAS	13	30	.3492	GT	.775	A
NSFO & JP-5	12	30	.3134	GT	.826	A
NSFO & AVGAS	10	30	.4043	LT	-.606	A

Table XIV

VERTREP Attribute Hypothesis Tests

Attribute	x	n	p_o	$x > np_o$ $x < np_o$	Z	Accept/ Reject
Delivery-Receiver Ship						
AFS-Cruiser	7	20	.4211	LT	-.418	A
AFS-Destroyer	9	20	.4612	LT	.124	A
AFS-Non-combatant	9	20	.4444	GT	-.175	A
AOE-Carrier	15	20	.7563	LT	.195	A
AOE-Cruiser	7	20	.3889	LT	-.128	A
AOE-Destroyer	6	20	.3165	LT	-.082	A
Time of VERTREP						
Day	11	30	.4584	LT	-.825	A
Night	15	30	.6824	LT	1.95	A
Receiver Type						
Simultaneous	16	30	.4939	GT	.250	A
Single	9	30	.4146	LT	-1.09	A
Delivery Method						
1 Helo/$\leq$ 500 yds	11	20	.4403	GT	.764	A
1 Helo/500-2000 yds	9	20	.5142	LT	-.351	A
1 Helo/ $>$ 2000 yds	9	20	.3854	GT	.364	A
2 Helos/ $\leq$ 500 yds	10	20	.4176	GT	.521	A
2 Helos/500-2000 yds	14	20	.6180	GT	.526	A
2 Helos/ $>$ 2000 yds	11	20	.6190	LT	.405	A
Product Delivered						
Ammunition	14	20	.5976	GT	.706	A
Provisions	10	20	.4364	GT	.348	A
Stores	7	20	.3802	LT	-.048	A
Provisions & Stores	10	20	.4574	GT	.166	A

IV. PREDICTION OF DELAY OCCURRENCE PRIOR TO AN UNREP

To this stage of the analysis, operational data has been analyzed to investigate the relationship between delays and UNREP attributes. Since the attributes of an UNREP are usually known prior to the UNREP operation, it seemed desirable to devise some method of predicting the occurrence of a delay prior to an UNREP. Using the results of the operational analysis, such a method based on conditional probabilities is presented in the following sections.

A. NATURE OF THE PROBLEM

An UNREP is an event that is characterized by many different attributes such as type of ships involved in the operation, time, location, type of receiving ship combination, delivery method, and product delivered. These various attributes are independent of each other. That is, for example, given that an UNREP occurred during the daytime, has no bearing on whether the UNREP took place in EASTPAC or WESTPAC. If it is known that the UNREP was from an AFS ship to a Carrier, it is not known what delivery rig was used. The fact that ammunition was delivered, tells one nothing about the receiver ship combination; ammunition could have been delivered to a single receiver or to simultaneous receivers. The addition of the information that either a delay occurred or it did not occur, does not change the independence of the attributes.

The UNREP attributes are clues as to the nature of the UNREP delay activity. In particular, as has been previously shown in this study, UNREP attributes are indications as to under what conditions delays occur. These indications or clues are in the form of conditional probabilities.

The question being addressed is: What is the probability a delay occurs given an UNREP characterized by certain attributes? When describing the Solid UNREPs, the notation $C_{i_j}^{(j)}$ was used to denote an UNREP attribute where the superscript j refers to the attribute being discussed, i.e., j = 1,2 ... , 6 (one j for each of the six attributes), and the subscript i_j denotes which case of the jth attribute under discussion occurred. More explicitly,

$C_{i_1}^{(1)}$ = the attribute that the UNREP was the i_1th Delivery Ship to Receiver Ship combination, where i_1 = 1,2, ... , 24, (see Table XV for the 24 Solid combinations),

$C_{i_2}^{(2)}$ = the attribute that the time of the UNREP was daytime or nighttime depending on i_2 = 1 or 2 respectively,

$C_{i_3}^{(3)}$ = the attribute that the UNREP location was EASTPAC or WESTPAC depending on i_3 = 1 or 2 respectively,

$C_{i_4}^{(4)}$ = the attribute of UNREP receiver ship combination which was either single receiver or simultaneous receivers depending on i_4 = 1 or 2 respectively,

$C_{i_5}^{(5)}$ = the attribute that the UNREP was the i_5th delivery method rig, where i_5 = 1, 2, ... , 10, (see Table XV for the 10 Solid delivery method rigs),

$C^{(6)}_{i_6}$ = the attribute that the product delivered during the UNREP was the i_6th product, where $i_6 = 1, 2, \ldots, 7$, (see Table XV for the 7 Solid products).

An UNREP of certain attributes was denoted by the event E; then the event, E, was represented by the intersection of the attributes that characterize the UNREP. That is,

$$E = C^{(1)}_{i_1} \cap C^{(2)}_{i_2} \cap C^{(3)}_{i_3} \cap C^{(4)}_{i_4} \cap C^{(5)}_{i_5} \cap C^{(6)}_{i_6} .$$

The event a delay occurred was denoted by D, and the event a delay did not occur was denoted by $\bar{D}$.

In terms of conditional probability, the question being addressed is: What is $P(D \mid E)$? Then from Bayes' Theorem:

$$P(D \mid E) = \frac{P(E \mid D)\ P(D)}{P(E)}, \quad (1)$$

where $P(E) = P(E \mid D)\ P(D) + P(E \mid \bar{D})\ P(\bar{D})$, (2)

and $P(D)$ = Probability of delay for Solid UNREP a priori any information, and $P(\bar{D})$ = Probability of no delay for Solid UNREP a priori any information.

The probabilities $P(E \mid D)$ and $P(E \mid \bar{D})$ must be evaluated. Using the independence of attributes condition previously described,

$$P(E \mid D) = P(C^{(1)}_{i_1} \mid D)\ P(C^{(2)}_{i_2} \mid D) \ \ldots\ P(C^{(6)}_{i_6} \mid D), \quad (3)$$

and applying Bayes' Theorem again:

$$P(C^{(j)}_{i_j} \mid D) = \frac{P(D \mid C^{(j)}_{i_j})\ P(C^{(j)}_{i_j})}{P(D)}, \quad (4)$$

and similarly $P(E \mid \bar{D}) = P(C_{i_1}^{(1)} \mid \bar{D})\ P(C_{i_2}^{(2)} \mid \bar{D}) \ \ldots\ P(C_{i_6}^{(6)} \mid \bar{D})$, (5)

$$\text{where } P(C_{i_j}^{(j)} \mid \bar{D}) = \frac{P(\bar{D} \mid C_{i_j}^{(j)})\ P(C_{i_j}^{(j)})}{P(\bar{D})} \quad , \quad (6).$$

It should be noted that since the occurrence of delays is a Bernoulli phenomenon, $P(\bar{D} \mid C_{i_j}^{(j)})$ is the complement of $P(D \mid C_{i_j}^{(j)})$; i.e., $P(\bar{D} \mid C_{i_j}^{(j)}) = 1 - P(D \mid C_{i_j}^{(j)})$. Then substituting equation 4 into equation 3:

$$P(E \mid D) = \frac{P(D \mid C_{i_1}^{(1)})\ P(C_{i_1}^{(1)})\ P(D \mid C_{i_2}^{(2)})\ P(C_{i_2}^{(2)}) \ldots P(D \mid C_{i_6}^{(6)}) P(C_{i_6}^{(6)})}{[P(D)]^6} \quad ,$$

$$P(E \mid D) = \frac{\left[\prod_{j=1}^{6} P(D \mid C_{i_j}^{(j)})\right] \left[\prod_{j=1}^{6} P(C_{i_j}^{(j)})\right]}{[P(D)]^6} \quad , \quad (7).$$

Making similar substitutions the new form of equation 1 becomes:

$$P(D \mid E) = \frac{\dfrac{\left[\prod_{j=1}^{6} P(D \mid C_{i_j}^{(j)})\right] \left[\prod_{j=1}^{6} P(C_{i_j}^{(j)})\right]}{[P(D)]^5}}{\dfrac{\left[\prod_{j=1}^{6} P(D \mid C_{i_j}^{(j)})\right] \left[\prod_{j=1}^{6} P(C_{i_j}^{(j)})\right]}{[P(D)]^5} + \dfrac{\left[\prod_{j=1}^{6} P(\bar{D} \mid C_{i_j}^{(j)})\right] \left[\prod_{j=1}^{6} P(C_{i_j}^{(j)})\right]}{[P(\bar{D})]^5}} \quad ,$$

$$P(D \mid E) = \frac{\dfrac{\prod_{j=1}^{6} P(D \mid C_{i_j}^{(j)})}{[P(D)]^5}}{\dfrac{\prod_{j=1}^{6} P(D \mid C_{i_j}^{(j)})}{[P(D)]^5} + \dfrac{\prod_{j=1}^{6} P(\bar{D} \mid C_{i_j}^{(j)})}{[P(\bar{D})]^5}} \quad , \quad (8).$$

All of the probabilities in equation 8 may be estimated for each observed UNREP, E, from the previous operational analysis of data. It should be noted that it was impossible to evaluate or estimate from the data directly the probabilities $P(E|D)$ in equation 1 and $P(C_{i_j}^{(j)} | D)$ in equation 3. There were 13,440 different possible attribute combinations, i.e., (24) (2) (2) (2) (10) (7) = 13,440, for Solid UNREPs. Obviously each one of these could not be evaluated from a data base representing 4609 UNREPs. In fact, the data base represented only 452 different Solid attribute combinations; several attribute combinations were observed more than once. Hence, $P(E|D)$ and $P(C_{i_j}^{(j)} | D)$ couldn't be evaluated directly from the data due to the limited number of attribute combinations observed. However, $P(D|E)$ could be evaluated for each observed E from equation 8, since the probabilities $P(D|C_{i_j}^{(j)})$ and $P(D)$ could be estimated from the data base for different UNREP attribute combinations.

B. PREDICTION METHOD

$P(D|E)$, the probability a delay occurred given an UNREP characterized by its attributes, was evaluated for each UNREP E for which data was available. That is, for Solid UNREPs given every possible combination of the six UNREP attributes for which data was available, the probability $P(D|E)$ was computed for each such E and these values were set equal to Y, i.e., $Y = P(D|E)$. In addition, for each UNREP E, a quantity X was evaluated where

$$X = \sum_{j=1}^{6} P(D|C_{i_j}^{(j)}),$$

i.e., X was the summation of conditional probabilities for UNREP attributes. Thus, for each UNREP a pair of values, (X,Y), were evaluated. These values were then graphed; the X value as the abcissa versus the Y value as ordinate. See Figure 1 for the graph for Solid UNREPs.

To make use of the prediction method for Solid UNREPs one uses Table XV. Entering Table XV with the known UNREP attributes, the conditional probability of a delay occurrence given each attribute is extracted from the table. These six values are added to compute the X value for that UNREP. Figure 1 is then utilized by entering with the X value and finding the corresponding Y value which represents the probability a delay will occur during that UNREP.

An analogous procedure was used in the case of Liquid UNREPs. The same equations as developed in Section A are valid with the change of the appropriate number of cases for each of the six attributes (i.e., Liquid UNREPs have a possible 16 different combinations for Delivery Ship to Receiver Ship, and eight possible cases of the Delivery Method attribute). Table XVI lists the appropriate conditional probabilities, and Figure 2 is used to obtain the probability of delay occurrence for an UNREP with the given attributes.

For VERTREPs there are only five analyzed attributes due to the lack of a location attribute. Again the same method is used with one less attribute than in the cases of Solid and Liquid UNREPs. The equations

of Section A with the change to five attributes and the appropriate number of cases of each attribute are valid. Table XVII contains the conditional probabilities for the five VERTREP attributes from which the X value is computed via addition. Figure 3 yields the Y value which is the probability of a delay occurrence for the VERTREP with those five attributes.

C. EXAMPLE OF PREDICTION METHOD

Suppose a few days prior to a scheduled UNREP it was desired to know if a delay would occur on the forthcoming UNREP. Assume the UNREP is to be a Liquid UNREP from an AO 143 Class Ship to a Mine-sweeper (Non-combatant). The UNREP will occur in the daytime in WESTPAC. Only a single ship will receive JP-5 via a two inch hose. From Table XVI, the quantity X is evaluated as follows:

$$X=P(DIC_{12}^{(1)})+P(DIC_{1}^{(2)})+P(DIC_{2}^{(3)})+P(DIC_{1}^{(4)})+P(DIC_{6}^{(5)})+P(DIC_{2}^{(6)}),$$

$$X=0.4909+0.3613+0.3936+0.4602+0.5603+0.5250 = 2.7913.$$

From Figure 2, an X value of 2.7913 yields a Y value of 0.82. Thus, it can be said that the probability of a delay occurring on this UNREP is estimated to be 0.82; i.e., in 82% of the UNREPs with these same attributes a delay should occur.

D. COMMENTS ON PREDICTION METHOD

The intention in presenting this prediction method was to attempt to develop a method based on the analysis of operational data which can be applied with the expectation of reasonable results. To the author's knowledge, this is the first known method of predicting a delay occurrence.

When comparing the results of the prediction method against the observed probability of a delay occurrence for the available data, comparisons that can be termed reasonable result. Some conditional probabilities of a delay given an UNREP characterized by specified attributes are slightly higher than the probability of delay occurrence observed for the available data while others are slightly lower. For the purpose of showing comparative examples, denote Z = Probability of delay occurrence for observed data. Then in the case of Solid UNREPs, there were 382 observations of the attribute combination where X = 3.9532; for this X value Z = 0.8455 and Y = 0.9685; i.e., the calculated P(D|E) was 0.123 higher than the observed probability of delay occurrence from the available data. There were 82 observations of the Solid UNREP attribute combination where X = 2.9274; for this X value Z = 0.3171, Y = 0.2358, and the calculated P(D|E) was 0.0813 lower than the observed probability of delay occurrence. For Liquid UNREPs there were 50 observations of the attribute combination where X = 2.6847; for this X value Z = 0.6200 and Y = 0.7398. There were 209 observations of the Liquid UNREP attribute combination where X = 2.3601; for this X value Z = 0.4498 and Y = 0.4343.

It should be pointed out that the values of the conditional probabilities used in this method are entirely dependent on the operational data analyzed. Given a radical departure in delay activity of UNREPs from that observed during the available time frame, the values of the conditional probabilities will change. Such a radical departure could

result from a tempo of operations mostly involved in peacetime missions; the expenditure rate of ammunition and fuel would have a large change resulting in a change in delay activity. For example, there would be a large change in the Brass Transfer delay under such conditions. In addition, a large change in the list of defined delays by COMSERVPAC would cause a change in the values of the conditional probabilities of attributes used in this analysis.

Regardless of the values of the conditional probabilities of delay occurrence for UNREP attributes, the method of prediction is still feasible. If a radical change in UNREP delay activity occurs, it is necessary to merely recompute the conditional probabilities based on the data that is indicative of that time period.

An examination of the tables of conditional probabilities for UNREP attributes and Figures 1, 2, and 3 leads to a conclusion on the effect each attribute has in causing a delay. In general, those attributes with the greater range of probabilities of a delay occurrence given that attribute, i.e., the greater range of $P(DIC_{i_j}^{(j)})$, will have a larger effect on whether or not that UNREP has a delay.

This effect can be seen with the following example. Suppose the summation of five conditional probabilities for Solid attributes (from any five of the six attributes) has resulted in a value of 2.8. The greater the range of $P(DIC_{i_j}^{(j)})$ (refer to Table XV for these probabilities) for the sixth attribute, the greater the range of the final probability that a delay occurred during that UNREP. Suppose the range of $P(DIC_{i_j}^{(j)})$ for the

sixth attribute is at least 0.3-0.7; the following three attributes have such ranges: Delivery Ship Class-Receiver Ship Type, Delivery Method, and Product Delivered. If the particular case of the sixth attribute has its $P(D|C_{i_j}^{(j)}) = 0.3$, then the final summation, the X value, is 3.1. This yields a probability of 0.41 that a delay will occur. If however, the particular case of the sixth attribute has $P(D|C_{i_j}^{(j)}) = 0.7$, then the X value is 3.5. This yields a probability of 0.80 that a delay will occur; that is, there is now twice the probability a delay will occur as in the former case. If on the other extreme, the range of $P(D|C_{i_j}^{(j)})$ for the sixth attribute is very small, then there will be a small range in the final probability of a delay occurrence. Such an example for the above case, would occur if the sixth attribute is Time. Then the final X value is either 3.3270 or 3.3821. The former value yields a final probability of delay occurrence of 0.57 and the latter X value yields a value of 0.69 for the same probability. The same reasoning is valid in the cases of Liquid UNREPs and VERTREPs.

Using the above logic, the attributes that have the greatest effect on delay occurrence for Solid UNREPs are the Delivery Ship Class-Receiver Ship Type, Delivery Method, and Product Delivered. The attribute that has the smallest effect on delay occurrence for Solid UNREPs is Time. For Liquid UNREPs, the attribute that has the greatest effect on delay occurrence is Delivery Ship Class-Receiver Ship Type; the attributes that have the least effect are Time, Location, and Receiver

Ship Combination. For VERTREPs, the attributes that have the greatest effect on delay occurrence are Delivery Ship Class-Receiver Ship Type and Product Delivered. The attribute that has the least effect on delay occurrence for VERTREPs is Receiver Ship Combination.

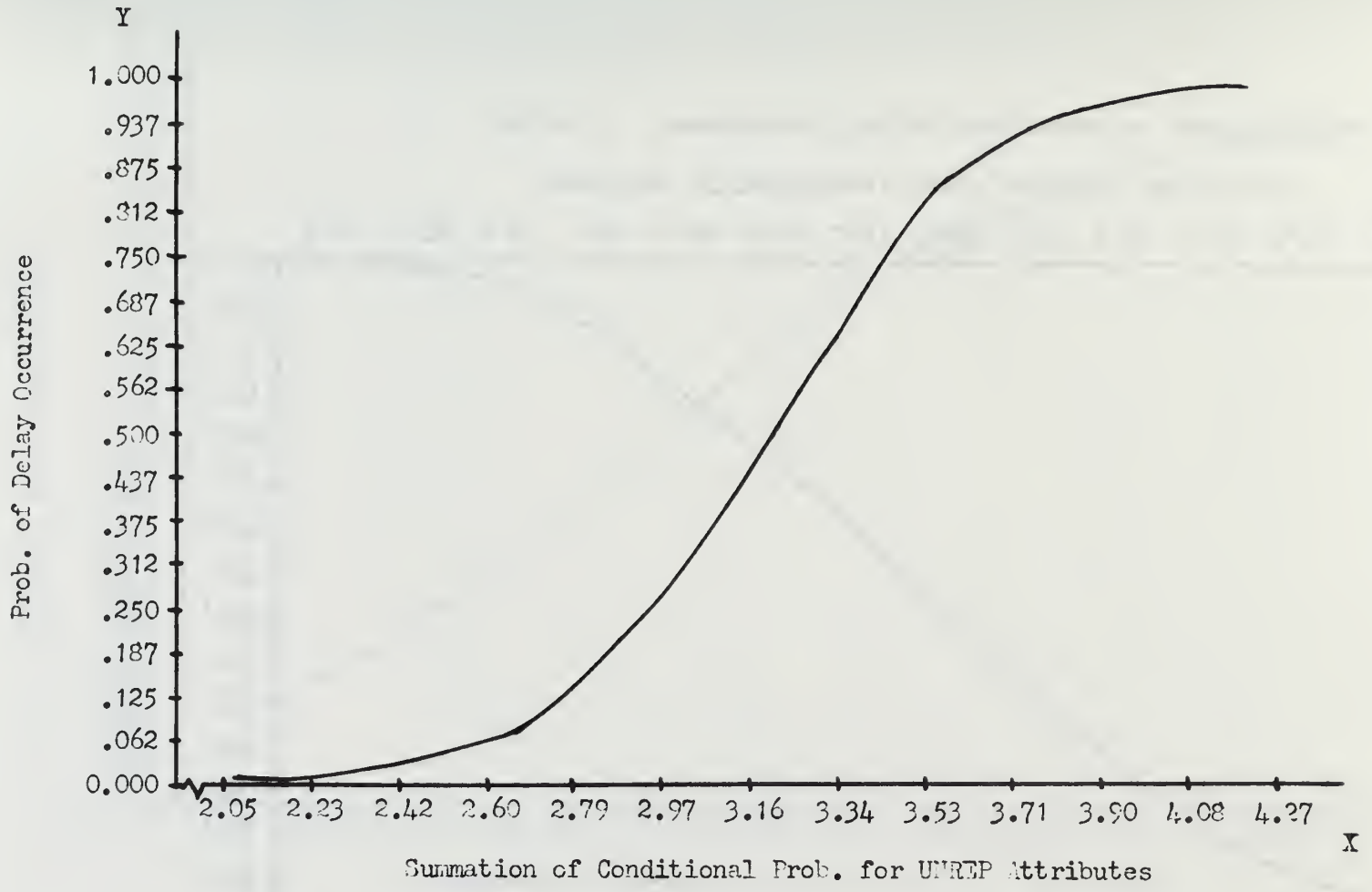

Figure 1. Prediction of Delay Occurrence for Solid UNREPs

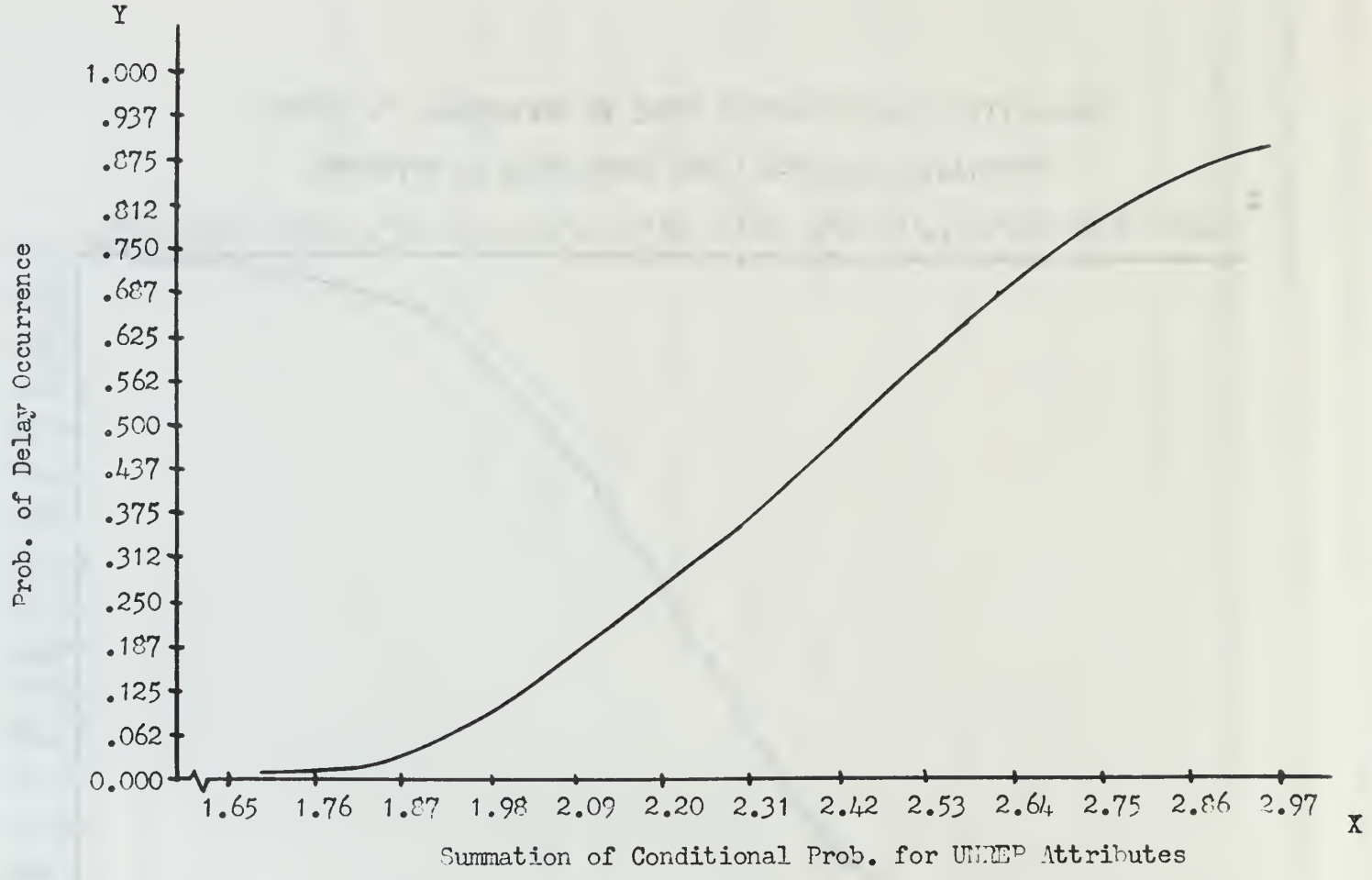

Figure 2. Prediction of Delay Occurrence for Liquid UNREPs

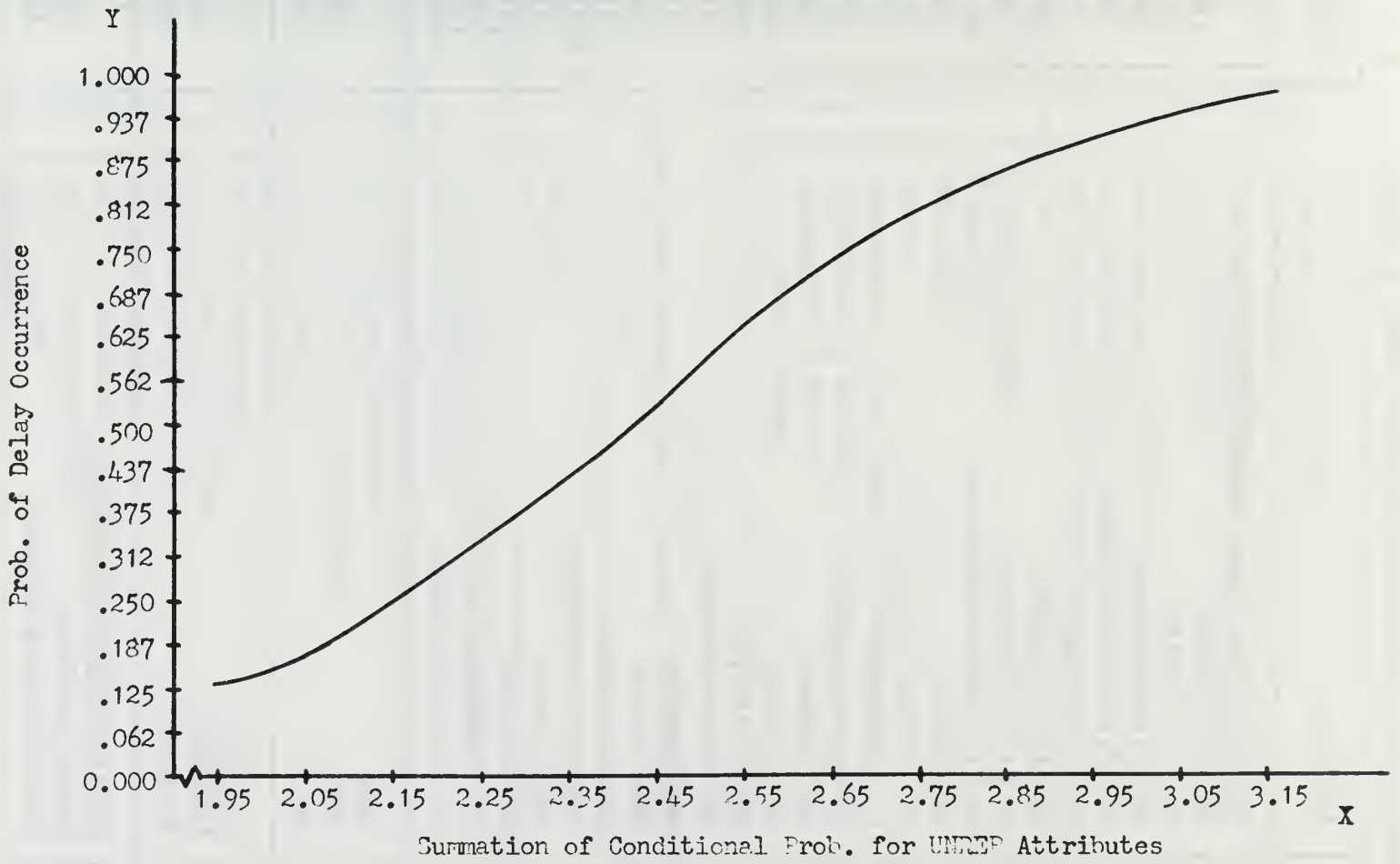

Figure 3. Prediction of Delay Occurrence for VERTREPs

Table XV

Conditional Probabilities For Solid UNREP Attributes

$C_{i_j}^{(j)}$	i_j	Attribute	$P(D \mid C_{i_j}^{(j)})$
$C_{i_1}^{(1)}$		Delivery Ship Class-Receiver Ship Type	
	1	AE 3/12-Carrier	.8536
	2	AE 3/12-Cruiser	.9176
	3	AE 3/12-Destroyer	.8299
	4	AE 3/12-Non-combatant	.7018
	5	AE 21/23-Carrier	.7480
	6	AE 21/23-Cruiser	.8125
	7	AE 21/23-Destroyer	.7990
	8	AE 21/23-Non-combatant	.4516
	9	AF-Carrier	.3889
	10	AF-Cruiser	.3385
	11	AF-Destroyer	.3484
	12	AF-Non-combatant	.4322
	13	AKS-Carrier	.4898
	14	AKS-Cruiser	.2687
	15	AKS-Destroyer	.3220
	16	AKS-Non-combatant	.4091
	17	AFS-Carrier	.2558
	18	AFS-Cruiser	.0000
	19	AFS-Destroyer	.1667
	20	AFS-Non-combatant	.2370
	21	AOE-Carrier	.5812
	22	AOE-Cruiser	.3617
	23	AOE-Destroyer	.1273
	24	AOE-Non-combatant	.2222
$C_{i_2}^{(2)}$		Time	
	1	Day	.5270
	2	Night	.5821
$C_{i_3}^{(3)}$		Location	
	1	EASTPAC	.4257
	2	WESTPAC	.5455
$C_{i_4}^{(4)}$		Receiver Ship Combination	
	1	Single Receiver	.5911
	2	Simultaneous Receivers	.4508

Table XV - Continued

$C_{i_5}^{(5)}$			
		Delivery Method	
	1	Burton Rig	.5205
	2	Drouge Rig	.4568
	3	Modified Housefall Rig	.6638
	4	Housefall Rig	.5622
	5	Manila Highline Rig	.4038
	6	Wire Highline Rig	.2620
	7	Fast Rig	.3333
	8	Ram Tensioned Highline Rig	.2000
	9	Two Different Rigs	.6506
	10	Three or more Different Rigs	.8929
$C_{i_6}^{(6)}$			
		Product Delivered	
	1	Ammunition	.7959
	2	Provisions	.3427
	3	Stores	.3342
	4	Ammunition, Provisions, & Stores	.4583
	5	Ammunition & Provisions	.2979
	6	Ammunition & Stores	.5714
	7	Provisions & Stores	.1864

Table XVI
Conditional Probabilities For Liquid UNREP Attributes

$C_{i_j}^{(j)}$	i_j	Attribute	$P(D \mid C_{i_j}^{(j)})$
$C_{i_1}^{(1)}$		Delivery Ship Class-Receiver Ship Type	
	1	AO 22/36/41-Carrier	.3068
	2	AO 22/36/41-Cruiser	.4448
	3	AO 22/36/41-Destroyer	.4400
	4	AO 22/36/41-Non-combatant	.5142
	5	AO 105-Carrier	.3280
	6	AO 105-Cruiser	.4167
	7	AO 105-Destroyer	.3426
	8	AO 105-Non-combatant	.5714
	9	AO 143-Carrier	.3253
	10	AO 143-Cruiser	.4935
	11	AO 143-Destroyer	.2741
	12	AO 143-Non-combatant	.4909
	13	AOE-Carrier	.0351
	14	AOE-Cruiser	.1250
	15	AOE-Destroyer	.0381
	16	AOE-Non-combatant	.1600

Table XVI - Continued

$C_{i_2}^{(2)}$		Time	
	1	Day	.3613
	2	Night	.4378
$C_{i_3}^{(3)}$		Location	
	1	EASTPAC	.2478
	2	WESTPAC	.3936
$C_{i_4}^{(4)}$		Receiver Ship Combination	
	1	Single Receiver	.4602
	2	Simultaneous Receivers	.3207
$C_{i_5}^{(5)}$		Delivery Method	
	1	7 in. hose without probe	.3596
	2	7 in. hose with probe	.3667
	3	6 in. hose without probe	.4769
	4	6 in. hose with probe	.3765
	5	4 in. hose	.3366
	6	2 in. hose	.5603
	7	Two Different hoses	.3514
	8	Three Different hoses	.5278
$C_{i_6}^{(6)}$		Product Delivered	
	1	NSFO	.3634
	2	JP-5	.5250
	3	AVGAS	.6000
	4	NSFO, JP-5, & AVGAS	.3492
	5	NSFO & JP-5	.3134
	6	NSFO & AVGAS	.4043
	7	JP-5 & AVGAS	.6667

Table XVII

Conditional Probabilities For VERTREP Attributes

$C_{i_j}^{(j)}$	i_j	Attribute	$P(D \mid C_{i_j}^{(j)})$
$C_{i_1}^{(1)}$		Delivery Ship Class-Receiver Ship Type	
	1	AFS-Carrier	.6923
	2	AFS-Cruiser	.4211
	3	AFS-Destroyer	.4612
	4	AFS-Non-combatant	.4444
	5	AOE-Carrier	.7563
	6	AOE-Cruiser	.3889
	7	AOE-Destroyer	.3165
	8	AOE-Non-combatant	.3684
$C_{i_2}^{(2)}$		Time	
	1	Day	.4584
	2	Night	.6824
$C_{i_3}^{(3)}$		Receiver Ship Combination	
	1	Single Receiver	.4146
	2	Simultaneous Receiver	.4939
$C_{i_4}^{(4)}$		Delivery Method	
	1	One helicopter/ $\leq$ 500 yds	.4403
	2	One helicopter/500-2000 yds	.5142
	3	One helicopter/ $>$ 2000 yds	.3854
	4	Two helicopters/ $\leq$ 500 yds	.4176
	5	Two helicopters/500-2000 yds	.6180
	6	Two helicopters/ $>$ 2000 yds	.6190
$C_{i_5}^{(5)}$		Product Delivered	
	1	Ammunition	.5976
	2	Provisions	.4364
	3	Stores	.3802
	4	Ammunition, Provisions, & Stores	.7667
	5	Ammunition & Provisions or Ammunition & Stores	.7209
	6	Provisions & Stores	.4574

V. CONCLUSIONS

Major conclusions and recommendations for further study are presented in the following sections.

A. MAJOR CONCLUSIONS

The probability of delay occurrences was estimated from the data thereby providing predictions of delay occurrence for each Delivery Ship Class; the probability distributions for delay occurrence were Binomial. Delay time probabilities were estimated from the data thereby providing predictions of the amount of time spent in delay for an UNREP given that a delay had occurred in which eight of the Delivery Ship Class delay time distributions were found to be Exponential, and the other four Delivery Ship Class delay time distributions were found to be Gamma.

The principal causes of delay activity for Solid UNREPs were age of the Delivery Ship and attributes dealing with the transfer of Brass. Ten percent of total alongside time for Solid UNREPs was spent in Brass Transfer Delay. The older AE Class ships had the most delay activity, and the newer AFS Class and AOE Class ships had the least delay activity.

The analysis of Liquid UNREPs showed a clear progression of large amounts of delay activity for the older Delivery Class ships to small quantities of delay activity for the newer Delivery Class ships. Another major cause of delay activity was UNREPs to the smaller and

older Destroyer and Non-combatant ships. The Brass Transfer Delay and Other Delay were the largest delay activities; the latter indicating a need for additional delineation of delays available to be reported on.

The principal cause for VERTREP delay activity points to problems on the receiving ships as reflected in the largest delay, Net Return Delay; in general, the receiving ships cannot receive cargo as fast as it can be provided by the delivery ship. There is a need to change the list of defined delays by the addition of a Helicopter Refueling Delay and a Brass Transfer Delay.

Two analyzed attributes caused unexpected results. It was shown that there is very little difference in delay time of day versus night UNREPs with only slightly more delay time at night than during the day. The probable reason for this is that Fleet units have become more conscious of UNREP problems during nighttime operations and have increased their preparations for nighttime UNREPs. The analysis of simultaneous receivers versus a single receiver indicated that considerably more delay activity resulted when the UNREP was to a single receiver. The probable reason for this result is due to the concentration of planning for simultaneous UNREPs and the lack of preparation for single UNREPs.

A method of predicting the occurrence of a delay when the UNREP attributes are known prior to an UNREP is presented. The method makes use of the conditional probability that a delay occurred given each of

the UNREP attributes analyzed for the study. Conclusions on the effect of the various attributes on delay occurrence are presented.

B. RECOMMENDATIONS FOR FURTHER STUDY

The following areas offer potential for subsequent investigation:

1. A method for predicting the amount of delay time for an UNREP given that a delay had occurred or a prediction method that results in a probability of a specified delay time for a forthcoming UNREP would be of benefit to the Fleet. It is believed that such a method based on UNREP attributes could be derived that would be similar to the prediction method presented in this study.

2. A complete statistical analysis and sensitivity analysis of the prediction method presented offers further study.

3. An investigation of UNREP performance as a function of UNREP attributes is possible; performance is usually measured by some type of transfer rate.

4. A study of the correlation of delay activity with performance transfer rates could be done.

5. A study of delay activity for the integrated effect of multi-product type ships versus single product type ships is another possibility. That is, combine the Solid, Liquid, and VERTREP delay activity for the AOE Class and the AOR Class and similarly combine the Solid and VERTREP delay activity of the AFS Class and the AE 26 Class, then analyze this data versus the delay data of the single product type replenishment ships.

APPENDIX A

The Kolmogorov-Smirnov Goodness of Fit Test [3]

To test the hypothesis that data under consideration follows a particular probability distribution, the Kolmogorov-Smirnov test was used. Using the VERTREP AOE delay time as an example, the test proceeds as follows:

1. Let $F(x)$ be the completely specified theoretical cumulative distribution function under the null hypothesis. In the example case, the null hypothesis was that the VERTREP AOE Class delay time distribution was an Exponential distribution with mean = $1/\lambda = 29.19$. $F(x)$ was computed for each of 15 intervals using the Exponential parameter λ.

2. Let $S(x)$ be the sample observed cumulative distribution function. In the example case, $S(x)$ resulted from the observed data and there were 15 values for $S(x)$.

3. Determine the maximum observed deviation, D, defined by

$$D = \max | F(x) - S(x) | \quad .$$

In the VERTREP AOE example, D was 0.0722.

4. If for the given number of observations of the sample distribution and for the chosen significance level, the observed deviation D is less than the critical value tabulated in the Kolmogorov-Smirnov Table of test values, the hypothesis is accepted. The tabled test values for n observations are equal to ϵ where

$$P(D < \epsilon) = L(\epsilon),$$

and $L(\varepsilon)$ is the significance level [6]. For 126 observations, the tabled value for the example case was 0.1202, i.e.,

$$P(D < 0.1202) = .95.$$

Hence, since $0.0722 < 0.1202$ the hypothesis was accepted at a 5% level of significance.

APPENDIX B

TABLES

The tables shown in this Appendix and all the computer work done for this thesis were done utilizing the IBM 360/67 computer at the Computer Facility of the Naval Postgraduate School.

The following abbreviations are used in the tables:

PC: percent

NO.: number

SUP-REC: Supply-Receiver

AE: Ammunition Ship

AF: Refrigerated Store Ship

AKS: Stores Issue Ship

AFS: Combat Store Ship

AOE: Fast Combat Support Ship

AO: Oiler Ship

BB: Battleship

DLG: Guided Missile Frigate

(J): Jumbo Class

w/o: without

Helo: Helicopter

The Delay Codes are explained in Table I. All times are in minutes.

Table XVIII

DELAY ANALYSIS FOR SOLID CARGO

AE 3/12 CLASS
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	8	2.14	280	2.84
AR	4	1.07	80	0.81
BO	10	2.67	380	3.85
BT	160	42.78	4190	42.49
ET	5	1.34	210	2.13
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	2	0.53	20	0.20
PT	18	4.81	570	5.78
RC	88	23.53	2260	22.92
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	9	2.41	140	1.42
SS	19	5.08	420	4.26
WT	1	0.27	50	0.51
OO	50	13.37	1260	12.78
TOTAL	374		9860	

TOTAL NO. OF UNREPS=	280
NO. OF UNREPS HAVING DELAYS=	239
PC UNREPS HAVING DELAYS=	85.36
PC SOLID UNREPS OF THIS SUP-REC TYPE=	6.08
TOTAL ALONGSIDE TIME=	47029
PC ALONGSIDE TIME SPENT IN DELAY=	20.97
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	12.24
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	12.40

Table XIX

DELAY ANALYSIS FOR SOLID CARGO

AE 3/12 CLASS
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	10	3.65	460	4.78
AR	7	2.55	170	1.77
BO	4	1.46	170	1.77
BT	146	53.28	6300	65.49
ET	0	0.0	0	0.0
MT	3	1.09	40	0.42
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	6	2.19	80	0.83
PT	27	9.85	620	6.44
RC	37	13.50	860	8.94
RS	3	1.09	50	0.52
SD	0	0.0	0	0.0
SK	8	2.92	130	1.35
SS	9	3.28	220	2.29
WT	0	0.0	0	0.0
OO	14	5.11	520	5.41
TOTAL	274		9620	

TOTAL NO. OF UNREPS=	170
NO. OF UNREPS HAVING DELAYS=	156
PC UNREPS HAVING DELAYS=	91.76
PC SOLID UNREPS OF THIS SUP-REC TYPE=	3.69
TOTAL ALONGSIDE TIME=	28715
PC ALONGSIDE TIME SPENT IN DELAY=	33.50
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	7.48
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	12.09

Table XX

DELAY ANALYSIS FOR SOLID CARGO

AE 3/12 CLASS
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	59	6.20	1320	5.95
AR	11	1.16	210	0.95
BO	10	1.05	190	0.86
BT	503	52.89	13560	61.16
ET	0	0.0	0	0.0
MT	24	2.52	300	1.35
NA	5	0.53	70	0.32
NL	13	1.37	150	0.68
NR	14	1.47	150	0.68
PT	54	5.68	1140	5.14
RC	59	6.20	1450	6.54
RS	6	0.63	70	0.32
SD	6	0.63	80	0.36
SK	42	4.42	530	2.39
SS	67	7.05	1390	6.27
WT	1	0.11	60	0.27
OO	77	8.10	1500	6.77
TOTAL	951		22170	

TOTAL NO. OF UNREPS=	782
NO. OF UNREPS HAVING DELAYS=	649
PC UNREPS HAVING DELAYS=	82.99
PC SOLID UNREPS OF THIS SUP-REC TYPE=	16.97
TOTAL ALONGSIDE TIME=	70209
PC ALONGSIDE TIME SPENT IN DELAY=	31.58
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	18.28
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	27.87

Table XXI

DELAY ANALYSIS FOR SOLID CARGO

AE 3/12 CLASS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	3	5.17	40	2.60
AR	1	1.72	10	0.65
BO	1	1.72	20	1.30
BT	17	29.31	400	25.97
ET	0	0.0	0	0.0
MT	1	1.72	10	0.65
NA	1	1.72	10	0.65
NL	0	0.0	0	0.0
NR	1	1.72	20	1.30
PT	4	6.90	120	7.79
RC	5	8.62	160	10.39
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	6	10.34	90	5.84
SS	4	6.90	160	10.39
WT	0	0.0	0	0.0
OO	14	24.14	500	32.47
TOTAL	58		1540	

TOTAL NO. OF UNREPS=	57
NO. OF UNREPS HAVING DELAYS=	40
PC UNREPS HAVING DELAYS=	70.18
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.24
TOTAL ALONGSIDE TIME=	5973
PC ALONGSIDE TIME SPENT IN DELAY=	25.78
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.55
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.94

Table XXII

DELAY ANALYSIS FOR SOLID CARGO

AE 21/23 CLASS
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	5	4.00	230	6.17
BT	58	46.40	1690	45.31
ET	2	1.60	90	2.41
MT	1	0.80	20	0.54
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	3	2.40	90	2.41
RC	22	17.60	650	17.43
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	5	4.00	70	1.88
SS	1	0.80	10	0.27
WT	1	0.80	10	0.27
OO	27	21.60	870	23.32
TOTAL	125		3730	

TOTAL NO. OF UNREPS=	127
NO. OF UNREPS HAVING DELAYS=	95
PC UNREPS HAVING DELAYS=	74.80
PC SOLID UNREPS OF THIS SUP-REC TYPE=	2.76
TOTAL ALONGSIDE TIME=	21762
PC ALONGSIDE TIME SPENT IN DELAY=	17.14
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	5.67
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	4.69

Table XXIII

DELAY ANALYSIS FOR SOLID CARGO

AF 21/23 CLASS
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	0.95	20	0.60
AR	1	0.95	10	0.30
BO	4	3.81	130	3.90
BT	67	63.81	2250	67.57
ET	0	0.0	0	0.0
MT	3	2.86	60	1.80
NA	0	0.0	0	0.0
NL	1	0.95	10	0.30
NR	0	0.0	0	0.0
PT	7	6.67	160	4.80
RC	9	8.57	300	9.01
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	1	0.95	70	2.10
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	11	10.48	320	9.61
TOTAL	105		3330	

TOTAL NO. OF UNREPS=	96
NO. OF UNREPS HAVING DELAYS=	78
PC UNREPS HAVING DELAYS=	81.25
PC SOLID UNREPS OF THIS SUP-REC TYPE=	2.08
TOTAL ALONGSIDE TIME=	12359
PC ALONGSIDE TIME SPENT IN DELAY=	26.94
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	3.22
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	4.19

Table XXIV

DELAY ANALYSIS FOR SOLID CARGO

AE 21/23 CLASS
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	5	1.26	120	1.35
AR	1	0.25	10	0.11
BO	4	1.01	40	0.45
BT	242	60.96	6460	72.91
ET	0	0.0	0	0.0
MT	14	3.53	180	2.03
NA	1	0.25	10	0.11
NL	8	2.02	80	0.90
NR	2	0.50	20	0.23
PT	30	7.56	560	6.32
RC	6	1.51	100	1.13
RS	3	0.76	40	0.45
SD	0	0.0	0	0.0
SK	6	1.51	70	0.79
SS	5	1.26	80	0.90
WT	0	0.0	0	0.0
OO	70	17.63	1090	12.30
TOTAL	397		8860	

TOTAL NO. OF UNREPS=	408
NO. OF UNREPS HAVING DELAYS=	326
PC UNREPS HAVING DELAYS=	79.90
PC SOLID UNREPS OF THIS SUP-REC TYPE=	8.85
TOTAL ALONGSIDE TIME=	30409
PC ALONGSIDE TIME SPENT IN DELAY=	29.14
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	7.92
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	11.14

Table XXV

DELAY ANALYSIS FOR SOLID CARGO

AE 21/23 CLASS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	0	0.0	0	0.0
BT	9	47.37	170	43.59
ET	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	1	5.26	10	2.56
RC	0	0.0	0	0.0
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	4	21.05	50	12.82
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	5	26.32	160	41.03
TOTAL	19		390	

TOTAL NO. OF UNREPS=	31
NO. OF UNREPS HAVING DELAYS=	14
PC UNREPS HAVING DELAYS=	45.16
PC SOLID UNREPS OF THIS SUP-REC TYPE=	0.67
TOTAL ALONGSIDE TIME=	2215
PC ALONGSIDE TIME SPENT IN DELAY=	17.61
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.58
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.49

Table XXVI

DELAY ANALYSIS FOR SOLID CARGO

AF TYPE TO CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	8.89	60	6.67
AR	0	0.0	0	0.0
BO	2	4.44	40	4.44
BT	1	2.22	40	4.44
ET	2	4.44	20	2.22
MT	4	8.89	40	4.44
NA	1	2.22	10	1.11
NL	0	0.0	0	0.0
NR	4	8.89	70	7.78
PT	7	15.56	170	18.89
RC	8	17.78	150	16.67
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	2	4.44	40	4.44
SS	2	4.44	30	3.33
WT	1	2.22	60	6.67
00	7	15.56	170	18.89
TOTAL	45		900	

TOTAL NO. OF UNREPS=	90
NO. OF UNREPS HAVING DELAYS=	35
PC UNREPS HAVING DELAYS=	38.89
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.95
TOTAL ALONGSIDE TIME=	8525
PC ALONGSIDE TIME SPENT IN DELAY=	10.56
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	2.22
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.13

Table XXVII

DELAY ANALYSIS FOR SOLID CARGO

AF TYPE
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	8.16	60	7.59
AR	0	0.0	0	0.0
BO	1	2.04	20	2.53
BT	1	2.04	10	1.27
ET	0	0.0	0	0.0
MT	8	16.33	100	12.66
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	7	14.29	70	8.86
PT	8	16.33	180	22.78
RC	8	16.33	180	22.78
RS	2	4.08	20	2.53
SD	1	2.04	20	2.53
SK	2	4.08	20	2.53
SS	3	6.12	30	3.80
WT	0	0.0	0	0.0
00	4	8.16	80	10.13
TOTAL	49		790	

TOTAL NO. OF UNREPS=	130
NO. OF UNREPS HAVING DELAYS=	44
PC UNREPS HAVING DELAYS=	33.85
PC SOLID UNREPS OF THIS SUP-REC TYPE=	2.82
TOTAL ALONGSIDE TIME=	7353
PC ALONGSIDE TIME SPENT IN DELAY=	10.74
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.91
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.99

Table XXVIII

DELAY ANALYSIS FOR SOLID CARGO

AF TYPE TO DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	20	8.62	330	9.88
AR	13	5.60	130	3.89
BO	4	1.72	50	1.50
BT	14	6.03	260	7.78
ET	0	0.0	0	0.0
MT	44	18.97	470	14.07
NA	5	2.16	80	2.40
NL	6	2.59	60	1.80
NR	17	7.33	170	5.09
PT	26	11.21	580	17.37
RC	19	8.19	310	9.28
RS	2	0.86	20	0.60
SD	1	0.43	10	0.30
SK	24	10.34	300	8.98
SS	3	1.29	30	0.90
WT	2	0.86	60	1.80
00	32	13.79	480	14.37
TOTAL	232		3340	

TOTAL NO. OF UNREPS=	554
NO. OF UNREPS HAVING DELAYS=	193
PC UNREPS HAVING DELAYS=	34.84
PC SOLID UNREPS OF THIS SUP-REC TYPE=	12.02
TOTAL ALONGSIDE TIME=	24608
PC ALONGSIDE TIME SPENT IN DELAY=	13.57
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	6.41
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	4.20

Table XXIX

DELAY ANALYSIS FOR SOLID CARGO

AF TYPE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	16	7.02	230	5.75
AR	12	5.26	130	3.25
BO	4	1.75	70	1.75
BT	1	0.44	40	1.00
ET	0	0.0	0	0.0
MT	38	16.67	440	11.00
NA	1	0.44	20	0.50
NL	1	0.44	30	0.75
NR	23	10.09	240	6.00
PT	23	10.09	530	13.25
RC	17	7.46	300	7.50
RS	2	0.88	20	0.50
SD	4	1.75	90	2.25
SK	32	14.04	450	11.25
SS	8	3.51	90	2.25
WT	3	1.32	120	3.00
OO	43	18.86	1200	30.00
TOTAL	228		4000	

TOTAL NO. OF UNREPS=	436
NO. OF UNREPS HAVING DELAYS=	188
PC UNREPS HAVING DELAYS=	43.12
PC SOLID UNREPS OF THIS SUP-REC TYPE=	9.46
TOTAL ALONGSIDE TIME=	24553
PC ALONGSIDE TIME SPENT IN DELAY=	16.29
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	6.39
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	5.03

Table XXX

DELAY ANALYSIS FOR SOLID CARGO

AKS TYPE TO CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	5	18.52	60	14.63
BO	0	0.0	0	0.0
BT	0	0.0	0	0.0
ET	2	7.41	80	19.51
MT	1	3.70	10	2.44
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	11	40.74	130	31.71
PT	0	0.0	0	0.0
RC	0	0.0	0	0.0
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	2	7.41	20	4.88
WT	0	0.0	0	0.0
OO	6	22.22	110	26.83
TOTAL	27		410	

TOTAL NO. OF UNREPS=	49
NO. OF UNREPS HAVING DELAYS=	24
PC UNREPS HAVING DELAYS=	48.98
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.06
TOTAL ALONGSIDE TIME=	2846
PC ALONGSIDE TIME SPENT IN DELAY=	14.41
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.74
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.52

Table XXXI

DELAY ANALYSIS FOR SOLID CARGO

AKS TYPE
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	4.55	10	3.57
AR	5	22.73	50	17.86
BO	0	0.0	0	0.0
BT	0	0.0	0	0.0
ET	0	0.0	0	0.0
MT	4	18.18	50	17.86
NA	0	0.0	0	0.0
NL	1	4.55	10	3.57
NR	1	4.55	10	3.57
PT	2	9.09	30	10.71
RC	3	13.64	50	17.86
RS	1	4.55	10	3.57
SD	0	0.0	0	0.0
SK	1	4.55	10	3.57
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	3	13.64	50	17.86
TOTAL	22		280	

TOTAL NO. OF UNREPS=	67
NO. OF UNREPS HAVING DELAYS=	18
PC UNREPS HAVING DELAYS=	26.87
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.45
TOTAL ALONGSIDE TIME=	3064
PC ALONGSIDE TIME SPENT IN DELAY=	9.14
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.80
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.35

Table XXXII

DELAY ANALYSIS FOR SOLID CARGO

AKS TYPE TO DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	9	8.82	120	9.60
AR	37	36.27	480	38.40
BO	0	0.0	0	0.0
BT	0	0.0	0	0.0
ET	0	0.0	0	0.0
MT	27	26.47	290	23.20
NA	2	1.96	20	1.60
NL	1	0.98	10	0.80
NR	7	6.86	70	5.60
PT	2	1.96	20	1.60
RC	4	3.92	90	7.20
RS	2	1.96	20	1.60
SD	1	0.98	30	2.40
SK	3	2.94	30	2.40
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	7	6.86	70	5.60
TOTAL	102		1250	

TOTAL NO. OF UNREPS=	295
NO. OF UNREPS HAVING DELAYS=	95
PC UNREPS HAVING DELAYS=	32.20
PC SOLID UNREPS OF THIS SUP-REC TYPE=	6.40
TOTAL ALONGSIDE TIME=	9612
PC ALONGSIDE TIME SPENT IN DELAY=	13.00
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	2.50
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.57

Table XXXIII

DELAY ANALYSIS FOR SOLID CARGO

AKS TYPE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	6	4.72	60	3.14
AR	25	19.69	360	18.85
BO	0	0.0	0	0.0
BT	1	0.79	10	0.52
ET	0	0.0	0	0.0
MT	26	20.47	270	14.14
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	7	5.51	80	4.19
PT	13	10.24	180	9.42
RC	6	4.72	90	4.71
RS	4	3.15	50	2.62
SD	0	0.0	0	0.0
SK	7	5.51	110	5.76
SS	2	1.57	40	2.09
WT	2	1.57	20	1.05
OO	28	22.05	640	33.51
TOTAL	127		1910	

TOTAL NO. OF UNREPS=	242
NO. OF UNREPS HAVING DELAYS=	99
PC UNREPS HAVING DELAYS=	40.91
PC SOLID UNREPS OF THIS SUP-REC TYPE=	5.25
TOTAL ALONGSIDE TIME=	11247
PC ALONGSIDE TIME SPENT IN DELAY=	16.98
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	2.93
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	2.40

Table XXXIV

DELAY ANALYSIS FOR SOLID CARGO

AFS TYPE TO CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	0	0.0	0	0.0
BT	1	7.14	30	8.57
ET	1	7.14	30	8.57
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	5	35.71	70	20.00
PT	0	0.0	0	0.0
RC	2	14.29	80	22.86
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	1	7.14	10	2.86
WT	2	14.29	100	28.57
OO	2	14.29	30	8.57
TOTAL	14		350	

TOTAL NO. OF UNREPS=	43
NO. OF UNREPS HAVING DELAYS=	11
PC UNREPS HAVING DELAYS=	25.58
PC SOLID UNREPS OF THIS SUP-REC TYPE=	0.93
TOTAL ALONGSIDE TIME=	3849
PC ALONGSIDE TIME SPENT IN DELAY=	9.09
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.00
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.44

Table XXXV

DELAY ANALYSIS FOR SOLID CARGO

AFS TYPE
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	0	0.0	0	0.0
BT	0	0.0	0	0.0
ET	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	0	0.0	0	0.0
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	0	0.0	0	0.0
TOTAL	0		0	

TOTAL NO. OF UNREPS=	8
NO. OF UNREPS HAVING DELAYS=	0
PC UNREPS HAVING DELAYS=	0.0
PC SOLID UNREPS OF THIS SUP-REC TYPE=	0.17
TOTAL ALONGSIDE TIME=	457
PC ALONGSIDE TIME SPENT IN DELAY=	0.0
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.12
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.0

Table XXXVI

DELAY ANALYSIS FOR SOLID CARGO

AFS TYPE TO DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	0	0.0	0	0.0
BT	0	0.0	0	0.0
ET	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	1	7.69	10	6.25
NL	0	0.0	0	0.0
NR	4	30.77	60	37.50
PT	0	0.0	0	0.0
RC	2	15.38	20	12.50
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	2	15.38	20	12.50
WT	0	0.0	0	0.0
00	4	30.77	50	31.25
TOTAL	13		160	

TOTAL NO. OF UNREPS=	54
NO. OF UNREPS HAVING DELAYS=	9
PC UNREPS HAVING DELAYS=	16.67
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.17
TOTAL ALONGSIDE TIME=	2972
PC ALONGSIDE TIME SPENT IN DELAY=	5.38
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.77
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.20

Table XXXVII

DELAY ANALYSIS FOR SOLID CARGO

AFS TYPE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	8	19.51	150	18.29
AR	4	9.76	60	7.32
BO	1	2.44	20	2.44
BT	0	0.0	0	0.0
ET	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	1	2.44	20	2.44
PT	3	7.32	40	4.88
RC	2	4.88	20	2.44
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	6	14.63	80	9.76
SS	3	7.32	30	3.66
WT	0	0.0	0	0.0
00	13	31.71	400	48.78
TOTAL	41		820	

TOTAL NO. OF UNREPS=	135
NO. OF UNREPS HAVING DELAYS=	32
PC UNREPS HAVING DELAYS=	23.70
PC SOLID UNREPS OF THIS SUP-REC TYPE=	2.93
TOTAL ALONGSIDE TIME=	7537
PC ALONGSIDE TIME SPENT IN DELAY=	10.88
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.96
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.03

Table XXXVIII

DELAY ANALYSIS FOR SOLID CARGO

AOE TYPE TO CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	1	0.99	10	0.29
BO	0	0.0	0	0.0
BT	83	82.18	2990	86.42
ET	3	2.97	50	1.45
MT	3	2.97	40	1.16
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	1	0.99	10	0.29
RC	3	2.97	90	2.60
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	7	6.93	270	7.80
TOTAL	101		3460	

TOTAL NO. OF UNREPS=	160
NO. OF UNREPS HAVING DELAYS=	93
PC UNREPS HAVING DELAYS=	58.12
PC SOLID UNREPS OF THIS SUP-REC TYPE=	3.47
TOTAL ALONGSIDE TIME=	27909
PC ALONGSIDE TIME SPENT IN DELAY=	12.40
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	7.27
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	4.35

Table XXXIX

DELAY ANALYSIS FOR SOLID CARGO

AOE TYPE
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	1	4.76	20	2.50
BT	15	71.43	650	81.25
ET	0	0.0	0	0.0
MT	3	14.29	30	3.75
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	2	9.52	100	12.50
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	0	0.0	0	0.0
TOTAL	21		800	

TOTAL NO. OF UNREPS=	47
NO. OF UNREPS HAVING DELAYS=	17
PC UNREPS HAVING DELAYS=	36.17
PC SOLID UNREPS OF THIS SUP-REC TYPE=	1.02
TOTAL ALONGSIDE TIME=	5507
PC ALONGSIDE TIME SPENT IN DELAY=	14.53
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.43
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.01

Table XL

DELAY ANALYSIS FOR SOLID CARGO

AOE TYPE TO DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	2.22	10	0.81
AR	2	4.44	40	3.25
BO	0	0.0	0	0.0
BT	23	51.11	820	66.67
ET	0	0.0	0	0.0
MT	10	22.22	100	8.13
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	0	0.0	0	0.0
PT	2	4.44	80	6.50
RC	2	4.44	60	4.88
RS	1	2.22	10	0.81
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
SS	1	2.22	60	4.88
WT	1	2.22	30	2.44
OO	2	4.44	20	1.63
TOTAL	45		1230	

TOTAL NO. OF UNREPS=	322
NO. OF UNREPS HAVING DELAYS=	41
PC UNREPS HAVING DELAYS=	12.73
PC SOLID UNREPS OF THIS SUP-REC TYPE=	6.99
TOTAL ALONGSIDE TIME=	20891
PC ALONGSIDE TIME SPENT IN DELAY=	5.89
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	5.44
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.55

Table XLI

DELAY ANALYSIS FOR SOLID CARGO

AOE TYPE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BO	0	0.0	0	0.0
BT	1	12.50	80	23.53
ET	0	0.0	0	0.0
MT	1	12.50	20	5.88
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	1	12.50	10	2.94
PT	0	0.0	0	0.0
RC	0	0.0	0	0.0
RS	0	0.0	0	0.0
SD	1	12.50	40	11.76
SK	0	0.0	0	0.0
SS	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	4	50.00	190	55.88
TOTAL	8		340	

TOTAL NO. OF UNREPS=	26
NO. OF UNREPS HAVING DELAYS=	6
PC UNREPS HAVING DELAYS=	23.08
PC SOLID UNREPS OF THIS SUP-REC TYPE=	0.56
TOTAL ALONGSIDE TIME=	4542
PC ALONGSIDE TIME SPENT IN DELAY=	7.49
PC SOLID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.18
PC SOLID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.43

Table XLII

DELAY ANALYSIS FOR LIQUID CARGO

AO 22/36/41 CLASS
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	6	8.11	80	4.30
AR	1	1.35	10	0.54
BT	4	5.41	120	6.45
HC	7	9.46	370	19.89
MT	1	1.35	10	0.54
NA	0	0.0	0	0.0
PT	6	8.11	130	6.99
RC	14	18.92	430	23.12
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	5	6.76	80	4.30
VT	5	6.76	50	2.69
WT	0	0.0	0	0.0
OO	25	33.78	580	31.18
TOTAL	74		1860	

TOTAL NO. OF UNREPS=	176
NO. OF UNREPS HAVING DELAYS=	54
PC UNREPS HAVING DELAYS=	30.68
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	2.08
TOTAL ALONGSIDE TIME=	30082
PC ALONGSIDE TIME SPENT IN DELAY=	6.18
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	4.72
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.74

Table XLIII

DELAY ANALYSIS FOR LIQUID CARGO

AO 22/36/41 CLASS
TO
CRUISER/BB

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	2	1.01	20	0.41
AR	8	4.02	120	2.43
BT	69	34.67	2490	50.51
HC	1	0.50	60	1.22
MT	11	5.53	110	2.23
NA	0	0.0	0	0.0
PT	41	20.60	800	16.23
RC	9	4.52	230	4.67
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	8	4.02	130	2.64
VT	0	0.0	0	0.0
WT	1	0.50	50	1.01
00	49	24.62	920	18.66
TOTAL	199		4930	

TOTAL NO. OF UNREPS=	344
NO. OF UNREPS HAVING DELAYS=	153
PC UNREPS HAVING DELAYS=	44.48
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	4.07
TOTAL ALONGSIDE TIME=	28567
PC ALONGSIDE TIME SPENT IN DELAY=	17.26
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	4.48
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	4.60

Table XLIV

DELAY ANALYSIS FOR LIQUID CARGO

AO 22/36/41 CLASS TO DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	68	4.23	1420	3.18
AR	61	3.79	1230	2.76
BT	536	33.33	22850	51.20
HC	35	2.18	780	1.75
MT	63	3.92	700	1.57
NA	6	0.37	220	0.49
PT	240	14.93	4160	9.32
RC	72	4.48	1910	4.28
RS	8	0.50	90	0.20
SD	3	0.19	70	0.16
SK	56	3.48	680	1.52
VT	2	0.12	40	0.09
WT	27	1.68	1180	2.64
OO	431	26.80	9300	20.84
TOTAL	1608		44630	

TOTAL NO. OF UNREPS=	2723
NO. OF UNREPS HAVING DELAYS=	1198
PC UNREPS HAVING DELAYS=	44.00
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	32.22
TOTAL ALONGSIDE TIME=	181226
PC ALONGSIDE TIME SPENT IN DELAY=	24.63
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	28.41
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	41.64

Table XLV

DELAY ANALYSIS FOR LIQUID CARGO

AO 22/36/41 CLASS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	25	2.17	490	1.81
AR	81	7.03	1810	6.70
BT	66	5.72	2810	10.40
HC	19	1.65	430	1.59
MT	57	4.94	680	2.52
NA	13	1.13	500	1.85
PT	171	14.83	3630	13.44
RC	58	5.03	1730	6.41
RS	9	0.78	100	0.37
SD	5	0.43	160	0.59
SK	119	10.32	1810	6.70
VT	0	0.0	0	0.0
WT	106	9.19	2600	9.63
OO	424	36.77	10260	37.99
TOTAL	1153		27010	

TOTAL NO. OF UNREPS=	1688
NO. OF UNREPS HAVING DELAYS=	868
PC UNREPS HAVING DELAYS=	51.42
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	19.98
TOTAL ALONGSIDE TIME=	143833
PC ALONGSIDE TIME SPENT IN DELAY=	18.78
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	22.55
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	25.20

Table XLVI

DELAY ANALYSIS FOR LIQUID CARGO

AO 105/(J) CLASS
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	1.16	20	1.11
AR	9	10.47	180	10.00
BT	8	9.30	170	9.44
HC	7	8.14	160	8.89
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	1	1.16	40	2.22
RC	18	20.93	310	17.22
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	3	3.49	30	1.67
VT	16	18.60	290	16.11
WT	2	2.33	150	8.33
00	21	24.42	450	25.00
TOTAL	86		1800	

TOTAL NO. OF UNREPS=	189
NO. OF UNREPS HAVING DELAYS=	62
PC UNREPS HAVING DELAYS=	32.80
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	2.24
TOTAL ALONGSIDE TIME=	22961
PC ALONGSIDE TIME SPENT IN DELAY=	7.84
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	3.60
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.68

Table XLVII

DELAY ANALYSIS FOR LIQUID CARGO

AO 105/(J) CLASS
TO
CRUISER/BB

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	3.33	20	3.03
AR	2	6.67	30	4.55
BT	10	33.33	280	42.42
HC	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	7	23.33	90	13.64
RC	1	3.33	50	7.58
RS	0	0.0	0	0.0
SD	1	3.33	30	4.55
SK	2	6.67	20	3.03
VT	0	0.0	0	0.0
WT	1	3.33	10	1.52
OO	5	16.67	130	19.70
TOTAL	30		660	

TOTAL NO. OF UNREPS=	60
NO. OF UNREPS HAVING DELAYS=	25
PC UNREPS HAVING DELAYS=	41.67
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	0.71
TOTAL ALONGSIDE TIME=	4175
PC ALONGSIDE TIME SPENT IN DELAY=	15.81
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.65
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.62

Table XLVIII

DELAY ANALYSIS FOR LIQUID CARGO

AO 105/(J) CLASS
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	24	6.43	290	4.02
AR	34	9.12	490	6.79
BT	81	21.72	2290	31.72
HC	3	0.80	50	0.69
MT	13	3.49	190	2.63
NA	0	0.0	0	0.0
PT	57	15.28	1040	14.40
RC	42	11.26	780	10.80
RS	6	1.61	60	0.83
SD	0	0.0	0	0.0
SK.	34	9.12	370	5.12
VT	1	0.27	10	0.14
WT	13	3.49	410	5.68
OO	65	17.43	1240	17.17
TOTAL	373		7220	

TOTAL NO. OF UNREPS=	899
NO. OF UNREPS HAVING DELAYS=	308
PC UNREPS HAVING DELAYS=	34.26
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	10.64
TOTAL ALONGSIDE TIME=	44065
PC ALONGSIDE TIME SPENT IN DELAY=	16.38
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	6.91
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	6.74

Table XLIX

DELAY ANALYSIS FOR LIQUID CARGO

AO 105/(J) CLASS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	3.13	70	2.52
AR	26	20.31	600	21.58
BT	3	2.34	130	4.68
HC	3	2.34	50	1.80
MT	5	3.91	70	2.52
NA	1	0.78	20	0.72
PT	22	17.19	520	18.71
RC	7	5.47	150	5.40
RS	2	1.56	20	0.72
SD	4	3.13	40	1.44
SK	11	8.59	150	5.40
VT	1	0.78	10	0.36
WT	7	5.47	100	3.60
OO	32	25.00	850	30.58
TOTAL	128		2780	

TOTAL NO. OF UNREPS=	182
NO. OF UNREPS HAVING DELAYS=	104
PC UNREPS HAVING DELAYS=	57.14
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	2.15
TOTAL ALONGSIDE TIME=	14288
PC ALONGSIDE TIME SPENT IN DELAY=	19.46
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	2.24
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	2.59

Table L

DELAY ANALYSIS FOR LIQUID CARGO

AO 143 CLASS
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	2	1.82	40	1.27
AR	3	2.73	60	1.91
BT	23	20.91	480	15.29
HC	4	3.64	70	2.23
MT	1	0.91	10	0.32
NA	0	0.0	0	0.0
PT	9	8.18	400	12.74
RC	12	10.91	370	11.78
RS	0	0.0	0	0.0
SD	1	0.91	10	0.32
SK	2	1.82	60	1.91
VT	7	6.36	140	4.46
WT	5	4.55	100	3.18
OO	41	37.27	1400	44.59
TOTAL	110		3140	

TOTAL NO. OF UNREPS=	249
NO. OF UNREPS HAVING DELAYS=	81
PC UNREPS HAVING DELAYS=	32.53
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	2.95
TOTAL ALONGSIDE TIME=	32728
PC ALONGSIDE TIME SPENT IN DELAY=	9.59
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	5.13
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	2.93

Table LI

DELAY ANALYSIS FOR LIQUID CARGO

AO 143 CLASS
TO
CRUISER/BB

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	2.27	30	2.01
AR	1	2.27	50	3.36
BT	17	38.64	630	42.28
HC	0	0.0	0	0.0
MT	1	2.27	20	1.34
NA	0	0.0	0	0.0
PT	6	13.64	160	10.74
RC	5	11.36	130	8.72
RS	1	2.27	10	0.67
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
VT	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	12	27.27	460	30.87
TOTAL	44		1490	

TOTAL NO. OF UNREPS=	77
NO. OF UNREPS HAVING DELAYS=	38
PC UNREPS HAVING DELAYS=	49.35
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	0.91
TOTAL ALONGSIDE TIME=	5801
PC ALONGSIDE TIME SPENT IN DELAY=	25.69
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.91
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.39

Table LII

DELAY ANALYSIS FOR LIQUID CARGO

AO 143 CLASS
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	21	6.60	370	5.46
AR	10	3.14	140	2.06
BT	61	19.18	1730	25.52
HC	16	5.03	320	4.72
MT	25	7.86	260	3.83
NA	0	0.0	0	0.0
PT	61	19.18	1100	16.22
RC	28	8.81	650	9.59
RS	8	2.52	90	1.33
SD	1	0.31	20	0.29
SK	12	3.77	140	2.06
VT	1	0.31	20	0.29
WT	12	3.77	380	5.60
00	62	19.50	1560	23.01
TOTAL	318		6780	

TOTAL NO. OF UNREPS=	974
NO. OF UNREPS HAVING DELAYS=	267
PC UNREPS HAVING DELAYS=	27.41
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	11.53
TOTAL ALONGSIDE TIME=	47690
PC ALONGSIDE TIME SPENT IN DELAY=	14.22
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	7.48
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	6.33

Table LIII

DELAY ANALYSIS FOR LIQUID CARGO

AO 143 CLASS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	4.60	40	1.53
AR	2	2.30	60	2.29
BT	7	8.05	260	9.92
HC	2	2.30	30	1.15
MT	5	5.75	70	2.67
NA	1	1.15	70	2.67
PT	17	19.54	780	29.77
RC	9	10.34	260	9.92
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	11	12.64	140	5.34
VT	0	0.0	0	0.0
WT	5	5.75	90	3.44
OO	24	27.59	820	31.30
TOTAL	87		2620	

TOTAL NO. OF UNREPS=	110
NO. OF UNREPS HAVING DELAYS=	54
PC UNREPS HAVING DELAYS=	49.09
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	1.30
TOTAL ALONGSIDE TIME=	12017
PC ALONGSIDE TIME SPENT IN DELAY=	21.80
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.88
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	2.44

Table LIV

DELAY ANALYSIS FOR LIQUID CARGO

AOE TYPE
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BT	0	0.0	0	0.0
HC	2	20.00	70	25.00
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	4	40.00	90	32.14
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
VT	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	4	40.00	120	42.86
TOTAL	10		280	

TOTAL NO. OF UNREPS=	171
NO. OF UNREPS HAVING DELAYS=	6
PC UNREPS HAVING DELAYS=	3.51
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	2.02
TOTAL ALONGSIDE TIME=	29746
PC ALONGSIDE TIME SPENT IN DELAY=	0.94
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	4.66
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.26

Table LV

DELAY ANALYSIS FOR LIQUID CARGO

AOE TYPE
TO
CRUISER/BB

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BT	5	62.50	390	82.98
HC	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	1	12.50	40	8.51
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
VT	0	0.0	0	0.0
WT	0	0.0	0	0.0
00	2	25.00	40	8.51
TOTAL	8		470	

TOTAL NO. OF UNREPS=	32
NO. OF UNREPS HAVING DELAYS=	4
PC UNREPS HAVING DELAYS=	12.50
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	0.38
TOTAL ALONGSIDE TIME=	4395
PC ALONGSIDE TIME SPENT IN DELAY=	10.69
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.69
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.44

Table LVI

DELAY ANALYSIS FOR LIQUID CARGO

ADE TYPE
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	2	7.69	90	10.59
AR	1	3.85	30	3.53
BT	9	34.62	380	44.71
HC	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	1	3.85	20	2.35
RC	5	19.23	80	9.41
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
VT	0	0.0	0	0.0
WT	2	7.69	80	9.41
OO	6	23.08	170	20.00
TOTAL	26		850	

TOTAL NO. OF UNREPS=	551
NO. OF UNREPS HAVING DELAYS=	21
PC UNREPS HAVING DELAYS=	3.81
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	6.52
TOTAL ALONGSIDE TIME=	32658
PC ALONGSIDE TIME SPENT IN DELAY=	2.60
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	5.12
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.79

Table LVII

DELAY ANALYSIS FOR LIQUID CARGO

AOE TYPE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BT	3	33.33	240	35.82
HC	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	0	0.0	0	0.0
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	1	11.11	10	1.49
VT	0	0.0	0	0.0
WT	0	0.0	0	0.0
OO	5	55.56	420	62.69
TOTAL	9		670	

TOTAL NO. OF UNREPS=	25
NO. OF UNREPS HAVING DELAYS=	4
PC UNREPS HAVING DELAYS=	16.00
PC LIQUID UNREPS OF THIS SUP-REC TYPE=	0.30
TOTAL ALONGSIDE TIME=	3716
PC ALONGSIDE TIME SPENT IN DELAY=	18.03
PC LIQUID ALONGSIDE TIME FOR THIS SUP-REC TYPE=	0.58
PC LIQUID DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	0.63

Table LVIII

DELAY ANALYSIS FOR VERTREP CARGO

AFS TO CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	1	2.86	5	0.82
BO	5	14.29	155	25.41
LA	0	0.0	0	0.0
MT	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	12	34.29	220	36.07
PT	6	17.14	30	4.92
RS	0	0.0	0	0.0
SS	1	2.86	10	1.64
OO	10	28.57	190	31.15
TOTAL	35		610	

TOTAL NO. OF UNREPS=	26
NO. OF UNREPS HAVING DELAYS=	18
PC UNREPS HAVING DELAYS=	69.23
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	2.88
TOTAL ALONGSIDE TIME=	2506
PC ALONGSIDE TIME SPENT IN DELAY=	24.34
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	4.68
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	6.12

Table LIX

DELAY ANALYSIS FOR VERTREP CARGO

AFS
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	1	1.28	20	2.16
AR	3	3.85	35	3.78
BO	3	3.85	25	2.70
LA	2	2.56	15	1.62
MT	2	2.56	10	1.08
NL	0	0.0	0	0.0
NR	34	43.59	465	50.27
PT	5	6.41	35	3.78
RS	0	0.0	0	0.0
SS	6	7.69	50	5.41
OO	22	28.21	270	29.19
TOTAL	78		925	

TOTAL NO. OF UNREPS=	114
NO. OF UNREPS HAVING DELAYS=	48
PC UNREPS HAVING DELAYS=	42.11
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	12.62
TOTAL ALONGSIDE TIME=	5196
PC ALONGSIDE TIME SPENT IN DELAY=	17.80
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	9.70
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	9.28

Table LX

DELAY ANALYSIS FOR VERTREP CARGO

AFS
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	7	3.95	100	5.36
AR	8	4.52	120	6.43
BO	9	5.08	60	3.22
LA	1	0.56	5	0.27
MT	12	6.78	140	7.51
NL	0	0.0	0	0.0
NR	96	54.24	1085	58.18
PT	9	5.08	50	2.68
RS	0	0.0	0	0.0
SS	6	3.39	45	2.41
OO	29	16.38	260	13.94
TOTAL	177		1865	

TOTAL NO. OF UNREPS=	258
NO. OF UNREPS HAVING DELAYS=	119
PC UNREPS HAVING DELAYS=	46.12
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	28.57
TOTAL ALONGSIDE TIME=	8228
PC ALONGSIDE TIME SPENT IN DELAY=	22.67
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	15.36
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	18.72

Table LXI

DELAY ANALYSIS FOR VERTREP CARGO

AFS
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	5	2.86	85	3.28
AR	8	4.57	125	4.82
BD	13	7.43	155	5.97
LA	2	1.14	15	0.58
MT	4	2.29	65	2.50
NL	0	0.0	0	0.0
NR	80	45.71	1125	43.35
PT	5	2.86	50	1.93
RS	0	0.0	0	0.0
SS	3	1.71	20	0.77
OO	55	31.43	955	36.80
TOTAL	175		2595	

TOTAL NO. OF UNREPS=	252
NO. OF UNREPS HAVING DELAYS=	112
PC UNREPS HAVING DELAYS=	44.44
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	27.91
TOTAL ALONGSIDE TIME=	12619
PC ALONGSIDE TIME SPENT IN DELAY=	20.56
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	23.56
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	26.04

Table LXII

DELAY ANALYSIS FOR VERTREP CARGO

AOE
TO
CARRIER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	2	1.25	20	0.62
AR	11	6.87	275	8.46
BO	9	5.62	185	5.69
LA	1	0.62	5	0.15
MT	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	39	24.37	1035	31.85
PT	34	21.25	415	12.77
RS	0	0.0	0	0.0
SS	16	10.00	325	10.00
OO	48	30.00	990	30.46
TOTAL	160		3250	

TOTAL NO. OF UNREPS=	119
NO. OF UNREPS HAVING DELAYS=	90
PC UNREPS HAVING DELAYS=	75.63
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	13.18
TOTAL ALONGSIDE TIME=	17706
PC ALONGSIDE TIME SPENT IN DELAY=	18.36
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	33.05
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	32.61

Table LXIII

DELAY ANALYSIS FOR VERTREP CARGO

AOE
TO
CRUISER/BB/DLG

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	1	4.76	10	4.65
BD	1	4.76	15	6.98
LA	0	0.0	0	0.0
MT	2	9.52	10	4.65
NL	0	0.0	0	0.0
NR	3	14.29	25	11.63
PT	3	14.29	25	11.63
RS	0	0.0	0	0.0
SS	7	33.33	85	39.53
OO	4	19.05	45	20.93
TOTAL	21		215	

TOTAL NO. OF UNREPS=	36
NO. OF UNREPS HAVING DELAYS=	14
PC UNREPS HAVING DELAYS=	38.89
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	3.99
TOTAL ALONGSIDE TIME=	2815
PC ALONGSIDE TIME SPENT IN DELAY=	7.64
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	5.25
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	2.16

Table LXIV

DELAY ANALYSIS FOR VERTREP CARGO

AOE
TO
DESTROYER

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	4	11.43	50	14.29
BO	7	20.00	90	25.71
LA	0	0.0	0	0.0
MT	1	2.86	5	1.43
NL	0	0.0	0	0.0
NR	4	11.43	20	5.71
PT	6	17.14	50	14.29
RS	0	0.0	0	0.0
SS	10	28.57	120	34.29
OO	3	8.57	15	4.29
TOTAL	35		350	

TOTAL NO. OF UNREPS=	79
NO. OF UNREPS HAVING DELAYS=	25
PC UNREPS HAVING DELAYS=	31.65
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	8.75
TOTAL ALONGSIDE TIME=	3529
PC ALONGSIDE TIME SPENT IN DELAY=	9.92
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	6.59
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	3.51

Table LXV

DELAY ANALYSIS FOR VERTREP CARGO

ADE
TO
NON-COMBATANTS

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	0	0.0	0	0.0
AR	1	7.69	5	3.23
BO	1	7.69	10	6.45
LA	0	0.0	0	0.0
MT	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	3	23.08	15	9.68
PT	4	30.77	70	45.16
RS	0	0.0	0	0.0
SS	2	15.38	30	19.35
OO	2	15.38	25	16.13
TOTAL	13		155	

TOTAL NO. OF UNREPS=	19
NO. OF UNREPS HAVING DELAYS=	7
PC UNREPS HAVING DELAYS=	36.84
PC VERTREP UNREPS OF THIS SUP-REC TYPE=	2.10
TOTAL ALONGSIDE TIME=	972
PC ALONGSIDE TIME SPENT IN DELAY=	15.95
PC VERTREP ALONGSIDE TIME FOR THIS SUP-REC TYPE=	1.81
PC VERTREP DELAY TIME SPENT BY DELAYS OF THIS SUP-REC TYPE=	1.56

TABLE LXVI

DAY/NIGHT DELAY ANALYSIS FOR SOLID CARGO

DAY DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	112	4.94	2100	4.03
AP	94	4.14	1230	2.36
BD	37	1.63	880	1.69
BT	945	41.67	27160	52.17
ET	9	0.40	290	0.56
MT	149	6.57	1680	3.23
NA	10	0.44	130	0.25
NL	2	0.09	40	0.08
NR	67	2.95	780	1.50
PT	170	7.50	3750	7.20
RC	167	7.36	3780	7.26
RS	17	0.75	210	0.40
SD	8	0.35	150	0.29
SK	94	4.14	1380	2.65
SS	87	3.84	1550	2.98
WT	11	0.49	390	0.75
OD	289	12.74	6560	12.60
TOTAL	2268		52060	

NIGHT DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	43	3.87	1170	4.26
AP	35	3.15	580	2.11
BD	14	1.26	500	1.82
BT	398	35.86	12790	46.54
ET	6	0.54	190	0.69
MT	66	5.95	790	2.87
NA	7	0.63	100	0.36
NL	29	2.61	310	1.13
NR	46	4.14	510	1.86
PT	61	5.50	1340	4.88
RC	137	12.34	3540	12.88
RS	9	0.81	100	0.36
SD	6	0.54	120	0.44
SK	64	5.77	810	2.95
SS	45	4.05	1090	3.97
WT	3	0.27	120	0.44
OD	141	12.70	3420	12.45
TOTAL	1110		27480	

TOTAL NO. OF UNREPS=	3381
NO. OF UNREPS HAVING DELAYS=	1729
PC DAY UNREPS HAVING DELAYS=	52.70
PC UNREPS CONDUCTED DURING DAY=	71.19
TOTAL ALONGSIDE TIME=	251277
PC DAY ALONGSIDE TIME SPENT IN DELAY=	20.72
PC TOTAL ALONGSIDE TIME SPENT IN DAY UNREPS=	65.41
PC TOTAL DELAY TIME SPENT BY DAY DELAYS=	65.45

TOTAL NO. OF UNREPS=	1328
NO. OF UNREPS HAVING DELAYS=	773
PC NIGHT UNREPS HAVING DELAYS=	58.21
PC UNREPS CONDUCTED DURING NIGHT=	28.81
TOTAL ALONGSIDE TIME=	132866
PC NIGHT ALONGSIDE TIME SPENT IN DELAY=	20.68
PC TOTAL ALONGSIDE TIME SPENT IN NIGHT UNREPS=	34.59
PC TOTAL DELAY TIME SPENT BY NIGHT DELAYS=	34.55

TABLE LXVII

DAY/NIGHT DELAY ANALYSIS FOR LIQUID CARGO

DAY DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	106	3.92	2120	3.24
AR	146	5.39	2680	4.09
BT	582	21.50	20930	31.96
HC	67	2.48	1690	2.58
MT	126	4.65	1430	2.18
NA	12	0.44	430	0.66
PT	411	15.18	8560	13.07
RC	162	5.98	3980	6.08
RS	20	0.74	220	0.34
SD	10	0.37	230	0.35
SK	137	5.06	1770	2.70
VT	22	0.81	370	0.56
WT	122	4.51	3250	4.96
DD	784	28.96	17830	27.23
TOTAL	2707		65490	

TOTAL NO. OF UNREPS=	5910
NO. OF UNREPS HAVING DELAYS=	2135
PC DAY UNREPS HAVING DELAYS=	36.13
PC UNREPS CONDUCTED DURING DAY=	69.94
TOTAL ALONGSIDE TIME=	425280
PC DAY ALONGSIDE TIME SPENT IN DELAY=	15.40
PC TOTAL ALONGSIDE TIME SPENT IN DAY UNREPS=	66.66
PC TOTAL DELAY TIME SPENT BY DAY DELAYS=	61.10

NIGHT DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	55	3.53	860	2.06
AR	93	5.98	2130	5.11
BT	320	20.57	14320	34.34
HC	32	2.06	700	1.68
MT	56	3.60	690	1.65
NA	9	0.58	380	0.91
PT	228	14.65	4310	10.34
RC	123	7.90	3230	7.75
RS	14	0.90	150	0.36
SD	5	0.32	100	0.24
SK	127	8.16	1850	4.44
VT	11	0.71	190	0.46
WT	59	3.79	1900	4.56
DD	424	27.25	10890	26.12
TOTAL	1556		41700	

TOTAL NO. OF UNREPS=	2540
NO. OF UNREPS HAVING DELAYS=	1112
PC NIGHT UNREPS HAVING DELAYS=	43.78
PC UNREPS CONDUCTED DURING NIGHT=	30.06
TOTAL ALONGSIDE TIME=	212668
PC NIGHT ALONGSIDE TIME SPENT IN DELAY=	19.61
PC TOTAL ALONGSIDE TIME SPENT IN NIGHT UNREPS=	33.34
PC TOTAL DELAY TIME SPENT BY NIGHT DELAYS=	38.90

TABLE LXVIII

DAY/NIGHT DELAY ANALYSIS FOR VERTREP CARGO

DAY DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	11	1.88	185	2.40
AR	34	5.80	560	7.25
BO	38	6.48	500	6.48
LA	6	1.02	40	0.52
MT	21	3.58	230	2.98
NL	0	0.0	0	0.0
NR	233	39.76	3045	39.44
PT	66	11.26	670	8.68
PS	0	0.0	0	0.0
SS	36	6.14	430	5.57
OO	141	24.06	2060	26.68
TOTAL	586		7720	

TOTAL NO. OF UNREPS=	818
NO. OF UNREPS HAVING DELAYS=	375
PC DAY UNREPS HAVING DELAYS=	45.84
PC UNREPS CONDUCTED DURING DAY=	90.59
TOTAL ALONGSIDE TIME=	43413
PC DAY ALONGSIDE TIME SPENT IN DELAY=	17.78
PC TOTAL ALONGSIDE TIME SPENT IN DAY UNREPS=	31.24
PC TOTAL DELAY TIME SPENT BY DAY DELAYS=	77.47

NIGHT DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	3.70	40	1.78
AR	3	2.78	65	2.90
BO	10	9.26	195	8.69
LA	0	0.0	0	0.0
MT	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	38	35.19	945	42.09
PT	6	5.56	55	2.45
PS	0	0.0	0	0.0
SS	15	13.89	255	11.36
OO	32	29.63	690	30.73
TOTAL	108		2245	

TOTAL NO. OF UNREPS=	85
NO. OF UNREPS HAVING DELAYS=	58
PC NIGHT UNREPS HAVING DELAYS=	68.24
PC UNREPS CONDUCTED DURING NIGHT=	9.41
TOTAL ALONGSIDE TIME=	10157
PC NIGHT ALONGSIDE TIME SPENT IN DELAY=	22.10
PC TOTAL ALONGSIDE TIME SPENT IN NIGHT UNREPS=	18.96
PC TOTAL DELAY TIME SPENT BY NIGHT DELAYS=	22.53

TABLE LXIX

WESTPAC/EASTPAC DELAY ANALYSIS FOR SOLID CARGO

WESTPAC DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	153	4.62	3190	4.11
AR	129	3.89	1810	2.33
BD	50	1.51	1370	1.77
BT	1328	40.08	39530	50.95
ET	15	0.45	480	0.62
MT	215	6.49	2470	3.18
NA	17	0.51	230	0.30
NL	31	0.94	350	0.45
NR	109	3.29	1210	1.56
PT	231	6.97	5090	6.56
RC	281	8.48	6540	8.43
RS	26	0.78	310	0.40
SD	14	0.42	270	0.35
SK	153	4.62	2070	2.67
SS	125	3.77	2440	3.15
WT	14	0.42	510	0.66
OO	422	12.74	9710	12.52
TOTAL	3313		77580	

TOTAL NO. OF UNREPS=	4508
NO. OF UNREPS HAVING DELAYS=	2459
PC WESTPAC UNREPS HAVING DELAYS=	54.55
PC WESTPAC UNREPS CONDUCTED=	97.81
TOTAL ALONGSIDE TIME=	372603
PC WESTPAC ALONGSIDE TIME SPENT IN DELAY=	20.82
PC ALONGSIDE TIME SPENT IN WESTPAC UNREPS=	97.00
PC DELAY TIME SPENT BY WESTPAC DELAYS=	97.54

EASTPAC DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	2	3.08	80	4.08
AR	0	0.0	0	0.0
BD	1	1.54	10	0.51
BT	15	23.08	420	21.43
ET	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
NL	0	0.0	0	0.0
NR	4	6.15	80	4.08
PT	0	0.0	0	0.0
RC	23	35.38	780	39.80
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	5	7.69	120	6.12
SS	7	10.77	200	10.20
WT	0	0.0	0	0.0
OO	8	12.31	270	13.78
TOTAL	65		1960	

TOTAL NO. OF UNREPS=	101
NO. OF UNREPS HAVING DELAYS=	43
PC EASTPAC UNREPS HAVING DELAYS=	42.57
PC EASTPAC UNREPS CONDUCTED=	2.19
TOTAL ALONGSIDE TIME=	11540
PC EASTPAC ALONGSIDE TIME SPENT IN DELAY=	16.98
PC ALONGSIDE TIME SPENT IN EASTPAC UNREPS=	3.00
PC DELAY TIME SPENT BY EASTPAC DELAYS=	2.46

TABLE LXX

WESTPAC/EASTPAC DELAY ANALYSIS FOR LIQUID CARGO

WESTPAC DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	147	3.67	2750	2.71
AR	232	5.79	4680	4.61
BT	900	22.44	35210	34.65
HC	76	1.90	1780	1.75
MT	176	4.39	1990	1.96
NA	18	0.45	720	0.71
PT	626	15.61	12610	12.41
RC	239	5.96	6020	5.92
RS	34	0.85	370	0.36
SD	13	0.32	240	0.24
SK	237	5.91	3250	3.20
VT	29	0.72	520	0.51
WT	178	4.44	4960	4.88
OO	1105	27.56	26510	26.09
TOTAL	4010		101610	

TOTAL NO. OF UNREPS=	7647
NO. OF UNREPS HAVING DELAYS=	3048
PC WESTPAC UNREPS HAVING DELAYS=	39.86
PC WESTPAC UNREPS CONDUCTED=	90.50
TOTAL ALONGSIDE TIME=	578250
PC WESTPAC ALONGSIDE TIME SPENT IN DELAY=	17.57
PC ALONGSIDE TIME SPENT IN WESTPAC UNREPS=	90.64
PC DELAY TIME SPENT BY WESTPAC DELAYS=	94.79

EASTPAC DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	14	5.53	230	4.12
AR	7	2.77	130	2.33
BT	2	0.79	40	0.72
HC	23	9.09	610	10.93
MT	6	2.37	130	2.33
NA	3	1.19	90	1.61
PT	13	5.14	260	4.66
RC	46	18.18	1190	21.33
RS	0	0.0	0	0.0
SD	2	0.79	90	1.61
SK	27	10.67	370	6.63
VT	4	1.58	40	0.72
WT	3	1.19	190	3.41
OO	103	40.71	2210	39.61
TOTAL	253		5580	

TOTAL NO. OF UNREPS=	803
NO. OF UNREPS HAVING DELAYS=	199
PC EASTPAC UNREPS HAVING DELAYS=	24.78
PC EASTPAC UNREPS CONDUCTED=	9.50
TOTAL ALONGSIDE TIME=	59698
PC EASTPAC ALONGSIDE TIME SPENT IN DELAY=	9.35
PC ALONGSIDE TIME SPENT IN EASTPAC UNREPS=	9.36
PC DELAY TIME SPENT BY EASTPAC DELAYS=	5.21

TABLE LXXI

SIMULTANEOUS RECEIVER/SINGLE RECEIVER DELAY ANALYSIS FOR SOLID CARGO

SIMULTANEOUS RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	48	5.10	1200	5.06
AR	36	3.82	510	2.15
BO	13	1.38	310	1.31
BT	389	41.30	13040	55.02
ET	9	0.96	240	1.01
MT	74	7.86	890	3.71
NA	7	0.74	90	0.38
NL	9	0.96	110	0.46
NR	45	4.78	520	2.19
PT	59	6.26	1450	6.12
RC	77	8.17	1720	7.26
RS	6	0.64	70	0.30
SD	3	0.32	110	0.46
SK	31	3.29	440	1.86
SS	27	2.87	490	2.07
WT	1	0.11	60	0.25
OO	108	11.46	2460	10.38
TOTAL	942		23700	

TOTAL NO. OF UNREPS=	1586
NO. OF UNREPS HAVING DELAYS=	715
PC SIMULT. UNREPS HAVING DELAYS=	45.08
PC SIMULT. UNREPS CONDUCTED=	34.41
TOTAL ALONGSIDE TIME=	141321
PC SIMULT. ALONGSIDE TIME SPENT IN DELAY=	16.77
PC ALONGSIDE TIME SPENT IN SIMULT. UNREPS=	36.79
PC DELAY TIME SPENT BY SIMULT. DELAYS=	29.80

SINGLE RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	107	4.39	2070	3.71
AR	93	3.82	1300	2.33
BO	38	1.56	1070	1.92
BT	954	39.16	26910	48.19
ET	6	0.25	240	0.43
MT	141	5.79	1590	2.85
NA	10	0.41	140	0.25
NL	22	0.90	240	0.43
NR	68	2.79	770	1.38
PT	172	7.06	3640	6.52
RC	227	9.32	5600	10.03
RS	20	0.82	240	0.43
SD	11	0.45	160	0.29
SK	127	5.21	1750	3.13
SS	105	4.31	2150	3.85
WT	13	0.53	450	0.81
OO	322	13.22	7520	13.47
TOTAL	2436		55840	

TOTAL NO. OF UNREPS=	3023
NO. OF UNREPS HAVING DELAYS=	1787
PC SINGLE UNREPS HAVING DELAYS=	59.11
PC SINGLE UNREPS CONDUCTED=	65.59
TOTAL ALONGSIDE TIME=	242822
PC SINGLE ALONGSIDE TIME SPENT IN DELAY=	23.00
PC ALONGSIDE TIME SPENT IN SINGLE UNREPS=	63.21
PC DELAY TIME SPENT BY SINGLE DELAYS=	70.20

TABLE LXXII

SIMULTANEOUS RECEIVER/SINGLE RECEIVER DELAY ANALYSIS FOR LIQUID CARGO

SIMULTANEOUS RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	65	3.24	1010	2.00
AR	101	5.03	2150	4.27
BT	412	20.54	15830	31.41
HC	73	3.64	1950	3.87
MT	79	3.94	920	1.83
NA	8	0.40	380	0.75
PT	299	14.91	6120	12.15
RC	170	8.47	4160	8.26
RS	22	1.10	220	0.44
SD	11	0.55	170	0.34
SK	121	6.03	1650	3.27
VT	31	1.55	530	1.05
WT	42	2.09	1480	2.94
00	572	28.51	13820	27.43
TOTAL	2006		50390	

TOTAL NO. OF UNREPS=	4734
NO. OF UNREPS HAVING DELAYS=	1537
PC SIMULT. UNREPS HAVING DELAYS=	32.47
PC SIMULT. UNREPS CONDUCTED=	56.02
TOTAL ALONGSIDE TIME=	381102
PC SIMULT. ALONGSIDE TIME SPENT IN DELAY=	13.22
PC ALONGSIDE TIME SPENT IN SIMULT, UNREPS=	59.74
PC DELAY TIME SPENT BY SIMULT. DELAYS=	47.01

SINGLE RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	96	4.25	1970	3.47
AR	138	6.11	2660	4.68
BT	490	21.71	19420	34.19
HC	26	1.15	440	0.77
MT	103	4.56	1200	2.11
NA	13	0.58	430	0.76
PT	340	15.06	6750	11.88
RC	115	5.10	3050	5.37
RS	12	0.53	150	0.26
SD	4	0.18	160	0.28
SK	143	6.34	1970	3.47
VT	2	0.09	30	0.05
WT	139	6.16	3670	6.46
00	636	28.18	14900	26.23
TOTAL	2257		56800	

TOTAL NO. OF UNREPS=	3716
NO. OF UNREPS HAVING DELAYS=	1710
PC SINGLE UNREPS HAVING DELAYS=	46.02
PC SINGLE UNREPS CONDUCTED=	43.98
TOTAL ALONGSIDE TIME=	256846
PC SINGLE ALONGSIDE TIME SPENT IN DELAY=	22.11
PC ALONGSIDE TIME SPENT IN SINGLE UNREPS=	40.26
PC DELAY TIME SPENT BY SINGLE DELAYS=	52.99

TABLE LXXIII

SIMULTANEOUS RECEIVER/SINGLE RECEIVER DELAY ANALYSIS FOR VERTREP CARGO

SIMULTANEOUS RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	11	1,84	130	1 51
AR	34	5,69	610	7 08
BO	41	6,86	600	6 96
LA	2	1,00	40	0,46
MT	13	2,17	85	0 99
NL	0	0,0	0	0,0
NR	227	37,96	3440	39,93
PT	68	11,37	655	7 60
RS	0	0,0	0	0,0
SS	48	8,03	665	7 72
OO	156	26,08	2390	27,74
TOTAL	598		8615	

TOTAL NO. OF UNREPS=	733
NO. OF UNREPS HAVING DELAYS=	365
PC SIMULT. UNREPS HAVING DELAYS=	49,39
PC SIMULT. UNREPS CONDUCTED=	81,84
TOTAL ALONGSIDE TIME=	48493
PC SIMULT. ALONGSIDE TIME SPENT IN DELAY=	17,77
PC ALONGSIDE TIME SPENT IN SIMULT. UNREPS=	90,52
PC DELAY TIME SPENT BY SIMULT. DELAYS=	86,45

SINGLE RECEIVER DATA

DELAY CODE	NO. OF DELAYS	PC TOTAL DELAYS OF THIS TYPE	DELAY TIME (MINS.)	PC TOTAL DELAY TIME DUE TO THIS DELAY
AW	4	4,17	95	7,04
AR	3	3,13	15	1,11
BO	7	7,29	95	7,04
LA	0	0,0	0	0,0
MT	8	8,33	145	10,74
NL	0	0,0	0	0,0
NR	44	45,83	550	40,74
PT	4	4,17	70	5 19
RS	0	0,0	0	0,0
SS	3	3,13	20	1,48
OO	23	23,96	360	26,67
TOTAL	96		1350	

TOTAL NO. OF UNREPS=	164
NO. OF UNREPS HAVING DELAYS=	69
PC SINGLE UNREPS HAVING DELAYS=	41,46
PC SINGLE UNREPS CONDUCTED=	18,16
TOTAL ALONGSIDE TIME=	5077
PC SINGLE ALONGSIDE TIME SPENT IN DELAY=	26,59
PC ALONGSIDE TIME SPENT IN SINGLE UNREPS=	9,48
PC DELAY TIME SPENT BY SINGLE DELAYS=	13 55

TABLE LXXIV

RIG DELAY ANALYSIS FOR SOLID CARGO

DLY CODE	BURTON				DOUBLE BURTON				DROUGE				MODIFIED HOUSEFALL				HOUSEFALL				DOUBLE HOUSEFALL			
	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	23	3.5	450	2.7	0	0.0	0	0.0	5	11.6	50	8.1	69	5.0	1520	4.8	6	4.3	140	3.5	0	0.0	0	0.0
AR	23	3.5	320	1.9	0	0.0	0	0.0	2	4.7	30	4.8	25	1.8	380	1.2	3	2.1	50	1.2	0	0.0	0	0.0
BD	12	1.9	510	3.0	0	0.0	0	0.0	0	0.0	0	0.0	14	1.0	280	0.9	2	1.4	30	0.7	0	0.0	0	0.0
BT	223	34.4	7170	42.7	0	0.0	0	0.0	3	7.0	50	8.1	684	50.0	19370	61.3	61	43.6	2320	57.3	0	0.0	0	0.0
FT	6	0.9	200	1.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	2.1	90	2.2	0	0.0	0	0.0
MT	31	4.8	380	2.3	0	0.0	0	0.0	6	14.0	60	9.7	48	3.5	610	1.9	9	6.4	110	2.7	0	0.0	0	0.0
NA	2	0.3	20	0.1	0	0.0	0	0.0	3	7.0	50	8.1	4	0.3	60	0.2	1	0.7	20	0.5	0	0.0	0	0.0
NL	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	20	1.5	240	0.8	0	0.0	0	0.0	0	0.0	0	0.0
NR	31	4.8	370	2.2	0	0.0	0	0.0	4	9.3	40	6.5	30	2.2	340	1.1	5	3.6	60	1.5	0	0.0	0	0.0
PT	29	4.3	740	4.4	0	0.0	0	0.0	2	4.7	30	4.8	62	4.5	1290	4.1	8	5.7	190	4.7	0	0.0	0	0.0
RC	83	12.8	1960	11.7	0	0.0	0	0.0	5	11.6	130	21.0	84	6.1	1810	5.7	17	12.1	430	10.6	0	0.0	0	0.0
RS	3	0.5	40	0.2	0	0.0	0	0.0	2	4.7	20	3.2	10	0.7	110	0.3	1	0.7	10	0.2	0	0.0	0	0.0
SD	2	0.3	50	0.3	0	0.0	0	0.0	1	2.3	30	4.8	5	0.4	80	0.3	1	0.7	20	0.5	0	0.0	0	0.0
SK	33	5.1	460	2.7	0	0.0	0	0.0	5	11.6	70	11.3	62	4.5	860	2.7	11	7.9	190	4.7	0	0.0	0	0.0
SS	24	3.7	540	3.2	0	0.0	0	0.0	1	2.3	10	1.6	77	5.6	1480	4.7	4	2.9	110	2.7	0	0.0	0	0.0
WT	8	1.2	300	1.8	0	0.0	0	0.0	1	2.3	20	3.2	2	0.1	90	0.3	0	0.0	0	0.0	0	0.0	0	0.0
OO	116	17.9	3300	19.6	0	0.0	0	0.0	3	7.0	30	4.8	173	12.6	3090	9.8	8	5.7	280	6.9	0	0.0	0	0.0
TOTAL	648		16810		0		0		43		620		1369		31610		140		4050		0		0	
	AA=	929			AA=	0			AA=	81			AA=	1505			AA=	185			AA=	0		
	BB=	483			BB=	0			BB=	37			BB=	999			BB=	104			BB=	0		
	CC=	52.05			CC=	0.0			CC=	45.68			CC=	66.38			CC=	56.22			CC=	0.0		
	DD=	20.13			DD=	0.0			DD=	1.76			DD=	32.65			DD=	4.01			DD=	0.0		
	EE=	101453			EE=	0			EE=	3435			EE=	119352			EE=	16269			EE=	0		
	FF=	16.57			FF=	0.0			FF=	18.05			FF=	26.48			FF=	24.89			FF=	0.0		
	GG=	26.41			GG=	0.0			GG=	0.89			GG=	31.07			GG=	4.24			GG=	0.0		
	HH=	21.13			HH=	0.0			HH=	0.78			HH=	39.74			HH=	5.09			HH=	0.0		

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC SOLID UNREPS FOR THIS RIG
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC SOLID ALONGSIDE TIME FOR THIS RIG
HH=PC SOLID DELAY TIME SPENT BY DELAYS FOR THIS RIG

TABLE LXXIV-CONTINUED

RIG DELAY ANALYSIS FOR SOLID CARGO

DLY CODE	MANILLA HIGHLINE				WIRE HIGHLINE				FAST				RAM TENSION HILINE				2 DIFFEERENT RIGS				3 OR MORE DIFF RIGS			
	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	4	3.7	40	2.6	17	6.7	340	7.6	0	0.0	0	0.0	0	0.0	0	0.0	31	4.0	730	3.8	0	0.0	0	0.0
AR	18	16.7	250	16.2	45	17.7	550	12.2	0	0.0	0	0.0	0	0.0	0	0.0	13	1.7	230	1.2	0	0.0	0	0.0
BD	4	3.7	60	3.9	3	1.2	70	1.6	0	0.0	0	0.0	0	0.0	0	0.0	16	2.1	430	2.2	0	0.0	0	0.0
BT	1	0.9	50	3.2	20	7.9	750	16.7	0	0.0	0	0.0	0	0.0	0	0.0	338	43.8	9900	51.1	13	31.0	340	34.0
FT	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	0.5	170	0.9	2	4.8	20	2.0
MT	29	26.9	330	21.4	54	21.3	570	12.7	0	0.0	0	0.0	0	0.0	0	0.0	38	4.9	410	2.1	0	0.0	0	0.0
NA	0	0.0	0	0.0	4	1.6	40	0.9	0	0.0	0	0.0	0	0.0	0	0.0	3	0.4	40	0.2	0	0.0	0	0.0
NL	0	0.0	0	0.0	6	2.4	60	1.3	0	0.0	0	0.0	0	0.0	0	0.0	5	0.6	50	0.3	0	0.0	0	0.0
NR	6	5.6	60	3.9	14	5.5	160	3.6	0	0.0	0	0.0	1	50.0	20	66.7	21	2.7	230	1.2	1	2.4	10	1.0
PT	17	15.7	350	22.7	13	5.1	290	6.4	0	0.0	0	0.0	0	0.0	0	0.0	85	11.0	1860	9.6	16	38.1	340	34.0
RC	1	0.9	10	0.6	16	6.3	350	7.8	0	0.0	0	0.0	0	0.0	0	0.0	92	11.9	2490	12.9	6	14.3	140	14.0
RS	2	1.9	20	1.3	5	2.0	60	1.3	0	0.0	0	0.0	0	0.0	0	0.0	3	0.4	50	0.3	0	0.0	0	0.0
SD	0	0.0	0	0.0	2	0.8	50	1.1	0	0.0	0	0.0	0	0.0	0	0.0	3	0.4	40	0.2	0	0.0	0	0.0
SK	8	7.4	90	5.8	20	7.9	270	6.0	0	0.0	0	0.0	0	0.0	0	0.0	19	2.5	250	1.3	0	0.0	0	0.0
SS	3	2.8	40	2.6	1	0.4	60	1.3	0	0.0	0	0.0	0	0.0	0	0.0	21	2.7	380	2.0	1	2.4	20	2.0
WT	0	0.0	0	0.0	1	0.4	40	0.9	0	0.0	0	0.0	0	0.0	0	0.0	2	0.3	60	0.3	0	0.0	0	0.0
OO	15	13.9	240	15.6	33	13.0	840	18.7	1	100.0	10	100.0	1	50.0	10	33.3	77	10.0	2050	10.6	3	7.1	130	13.0
TOTAL	108		1540		254		4500		1		10		2		30		771		19370		42		1000	
	AA= 208 BB= 84 CC= 40.38 DD= 4.51 EE= 9543 FF= 16.14 GG= 2.48 HH= 1.94				AA= 813 BB= 213 CC= 26.20 DD= 17.64 EE= 40635 FF= 11.07 GG= 10.58 HH= 5.66				AA= 3 BB= 1 CC= 33.33 DD= 0.07 EE= 169 FF= 5.92 GG= 0.04 HH= 0.01				AA= 5 BB= 1 CC= 20.00 DD= 0.11 EE= 432 FF= 6.94 GG= 0.11 HH= 0.04				AA= 853 BB= 555 CC= 65.06 DD= 18.51 EE= 89519 FF= 21.64 GG= 23.30 HH= 24.35				AA= 28 BB= 25 CC= 89.29 DD= 0.61 EE= 3337 FF= 29.97 GG= 0.87 HH= 1.26			

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC SOLID UNREPS FOR THIS RIG
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC SOLID ALONGSIDE TIME FOR THIS RIG
HH=PC SOLID DELAY TIME SPENT BY DELAYS FOR THIS RIG

TABLE LXXV

HOSE DELAY ANALYSIS FOR LIQUID CARGO

DLY CODE	7 INCH W/O PROBE				7 INCH WITH PROBE				6 INCH W/O PROBE				6 INCH WITH PROBE				4 INCH				2 INCH			
	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	66	4.2	950	2.2	24	4.9	350	2.8	8	2.1	150	1.6	1	0.8	20	0.7	48	5.8	1240	5.6	12	2.0	230	1.9
AR	66	4.2	1490	3.5	13	2.6	210	1.7	27	6.9	640	6.9	5	3.8	60	2.2	60	7.3	1060	4.8	55	9.1	1030	8.6
BT	389	24.7	16020	37.7	117	23.7	4660	37.4	76	19.5	2710	29.3	34	26.2	920	33.1	243	29.5	9350	42.6	5	0.8	260	2.2
HC	25	1.6	540	1.3	29	5.9	680	5.5	5	1.3	230	2.5	1	0.8	10	0.4	19	2.3	390	1.8	8	1.3	150	1.3
MT	49	3.1	670	1.6	17	3.4	200	1.6	28	7.2	280	3.0	13	10.0	130	4.7	24	2.9	250	1.1	47	7.8	530	4.4
NA	10	0.6	430	1.0	2	0.4	50	0.4	0	0.0	0	0.0	0	0.0	0	0.0	3	0.4	140	0.6	6	1.0	190	1.6
PT	234	14.8	5610	13.2	69	14.0	1170	9.4	74	19.0	1300	14.1	12	9.2	200	7.2	138	16.7	2600	11.8	81	13.4	1300	10.9
RC	106	6.7	2720	6.4	46	9.3	1090	8.7	28	7.2	860	9.3	10	7.7	240	8.6	44	5.3	1050	4.8	19	3.1	420	3.5
RS	13	0.8	130	0.3	3	0.6	30	0.2	2	0.5	20	0.2	2	1.5	20	0.7	7	0.8	90	0.4	6	1.0	70	0.6
SD	9	0.6	130	0.3	0	0.0	0	0.0	2	0.5	100	1.1	1	0.8	30	1.1	3	0.4	70	0.3	0	0.0	0	0.0
SK	144	9.1	1960	4.6	28	5.7	310	2.5	24	6.2	440	4.8	3	2.3	30	1.1	28	3.4	390	1.8	27	4.5	340	2.8
VT	11	0.7	210	0.5	4	0.8	50	0.4	1	0.3	10	0.1	0	0.0	0	0.0	1	0.1	20	0.1	0	0.0	0	0.0
WT	17	1.1	730	1.7	5	1.0	230	1.8	3	0.8	70	0.8	6	4.6	240	8.6	33	4.0	1270	5.8	110	18.2	2470	20.7
OO	439	27.8	10860	25.6	137	27.7	3440	27.6	111	28.5	2430	26.3	42	32.3	880	31.7	174	21.1	4040	18.4	230	38.0	4940	41.4
TOTAL	1578		42450		494		12470		389		9240		130		2780		825		21960		606		11930	
	AA=		3370		AA=		998		AA=		629		AA=		247		AA=		1925		AA=		821	
	BB=		1212		BB=		366		BB=		300		BB=		93		BB=		648		BB=		460	
	CC=		35.96		CC=		36.67		CC=		47.69		CC=		37.65		CC=		33.66		CC=		56.03	
	DD=		39.88		DD=		11.81		DD=		7.44		DD=		2.92		DD=		22.78		DD=		9.72	
	EE=		280477		EE=		68154		EE=		56181		EE=		16126		EE=		114069		EE=		50061	
	FF=		15.13		FF=		18.30		FF=		16.45		FF=		17.24		FF=		19.25		FF=		23.83	
	GG=		43.97		GG=		10.68		GG=		8.81		GG=		2.53		GG=		17.88		GG=		7.85	
	HH=		39.60		HH=		11.63		HH=		8.62		HH=		2.59		HH=		20.49		HH=		11.13	

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC LIQUID UNREPS FOR THIS HOSE
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC LIQUID ALONGSIDE TIME FOR THIS HOSE
HH=PC LIQUID DELAY TIME SPENT BY DELAYS FOR THIS HOSE

TABLE LXXV-CONTINUED

DLY CODE	3 DIFFERENT HOSES NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	2 DIFFERENT HOSES NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	0	0.0	0	0.0	2	0.9	40	0.7
AR	1	4.5	40	6.9	12	5.5	280	4.8
BT	6	27.3	150	25.9	32	14.6	1180	20.4
HC	1	4.5	80	13.8	11	5.0	310	5.4
MT	1	4.5	10	1.7	3	1.4	50	0.9
NA	0	0.0	0	0.0	0	0.0	0	0.0
PT	2	9.1	70	12.1	29	13.2	620	10.7
RC	1	4.5	40	6.9	31	14.2	790	13.7
RS	0	0.0	0	0.0	1	0.5	10	0.2
SD	0	0.0	0	0.0	0	0.0	0	0.0
SK	0	0.0	0	0.0	10	4.6	150	2.6
VT	0	0.0	0	0.0	16	7.3	270	4.7
WT	1	4.5	10	1.7	6	2.7	130	2.2
OO	9	40.9	180	31.0	66	30.1	1950	33.7
TOTAL	22		580		219		5780	

	3 DIFFERENT HOSES	2 DIFFERENT HOSES
AA=	36	424
BB=	19	149
CC=	52.78	35.14
DD=	0.43	5.02
EE=	4525	48355
FF=	12.82	11.95
GG=	0.71	7.58
HH=	0.54	5.39

TABLE LXXVI

HELO/RANGE DELAY ANALYSIS FOR VERTREP CARGO

DLY CODE	ONE HELO/RANGE 1 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	ONE HELO/RANGE 2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	ONE HELO/RANGE 3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	TWO HELOS/RANGE 1 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	TWO HELOS/RANGE 2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	TWO HELOS/RANGE 3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	2	0.8	70	1.8	4	2.5	20	1.1	0	0.0	0	0.0	3	4.5	25	2.4	5	5.0	100	7.7	1	1.6	10	1.0
AR	14	5.5	235	6.2	10	5.3	120	6.6	5	8.6	90	8.6	2	3.0	25	2.4	4	4.0	80	6.1	2	3.3	75	7.4
AF	16	6.4	220	5.6	11	7.0	130	7.1	2	3.4	40	4.3	8	12.1	100	10.4	7	7.0	85	6.5	4	6.6	30	3.0
LA	2	0.8	15	0.4	1	0.6	5	0.3	0	0.0	0	0.0	1	1.5	10	1.0	1	1.0	5	0.4	1	1.6	5	0.5
MT	6	2.4	50	1.3	3	5.1	70	3.8	2	3.4	35	3.7	0	0.0	0	0.0	5	5.0	75	5.7	0	0.0	0	0.0
NL	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NR	80	31.9	1500	38.4	77	48.7	950	52.1	30	51.7	375	39.9	16	24.2	195	19.9	39	39.0	540	41.4	29	47.5	430	42.6
PT	36	14.3	365	9.3	12	7.6	80	4.4	3	5.2	60	6.4	10	15.2	90	9.2	7	7.0	45	3.4	4	6.6	85	8.4
RS	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SS	30	12.0	480	12.3	10	6.3	110	6.0	1	1.7	10	1.1	3	4.5	25	2.5	6	6.0	55	4.2	1	1.6	5	0.5
OO	65	25.9	970	24.9	25	15.8	340	18.6	15	25.9	330	35.1	23	34.8	420	42.9	26	26.0	320	24.5	19	31.1	370	36.6
TOTAL	251		3905		158		1825		58		940		66		980		100		1305		61		1010	

AA=	253	AA=	212	AA=	96	AA=	91	AA=	89	AA=	63
BB=	156	BB=	109	BB=	37	BB=	38	BB=	55	BB=	39
CC=	44.33	CC=	51.42	CC=	38.54	CC=	41.76	CC=	61.80	CC=	61.90
DD=	33.38	DD=	23.48	DD=	10.63	DD=	10.08	DD=	9.86	DD=	6.99
EE=	24034	EE=	8054	EE=	4458	EE=	7226	EE=	5738	EE=	4008
FF=	15.25	FF=	22.65	FF=	21.09	FF=	13.56	FF=	22.51	FF=	25.20
GG=	44.35	GG=	15.04	GG=	8.32	GG=	13.49	GG=	10.82	GG=	7.43
HH=	33.10	HH=	18.31	HH=	9.43	HH=	9.83	HH=	13.10	HH=	10.14

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC VERTREP UNREPS FOR THIS HELO/RANGE
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC VERTREP ALONGSIDE TIME FOR THIS HELO/RANGE
HH=PC VERTREP DELAY TIME SPENT BY DELAYS FOR THIS HELO/RANGE

RANGE 1 IS LESS THAN OR EQUAL TO 500 YDS
RANGE 2 IS GREATER THAN 500 YDS AND LESS THAN OR EQUAL TO 2000 YDS
RANGE 3 IS GREATER THAN 2000 YDS

TABLE LXXVII

PRODUCT DELAY ANALYSIS FOR SOLID CARGO

DLY CODE	PRODUCT 1 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1,2,&3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1&2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1&3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	86	3.6	2240	3.6	46	8.0	730	7.6	17	5.6	220	4.9	0	0.0	0	0.0	1	6.7	10	1.7	0	0.0	0	0.0
AR	26	1.1	520	0.8	25	4.3	260	2.7	75	24.9	990	22.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
BO	38	1.6	1160	1.9	12	2.1	200	2.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
BT	1278	53.4	37820	60.3	19	3.3	460	4.8	3	1.0	100	2.2	10	71.4	330	80.5	12	80.0	460	78.0	19	95.0	660	95.7
ET	7	0.3	300	0.5	3	0.5	40	0.4	3	1.0	100	2.2	1	7.1	10	2.4	0	0.0	0	0.0	0	0.0	0	0.0
MT	48	2.0	640	1.0	101	17.5	1130	11.8	64	21.3	680	15.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NA	7	0.3	90	0.1	7	1.2	110	1.2	2	0.7	20	0.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NL	22	0.9	240	0.4	7	1.2	90	0.9	2	0.7	20	0.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NR	26	1.1	300	0.5	54	9.4	600	6.3	26	8.6	290	6.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
PT	144	6.0	3270	5.2	65	11.3	1470	15.4	18	6.0	270	6.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
RC	230	9.6	5900	9.4	52	9.0	940	9.8	13	4.3	230	5.2	0	0.0	0	0.0	1	6.7	60	10.2	1	5.0	30	4.3
RS	12	0.5	160	0.3	6	1.0	60	0.6	8	2.7	90	2.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SD	4	0.3	80	0.1	6	1.0	120	1.3	2	0.7	70	1.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SK	82	3.4	1160	1.9	61	10.6	820	8.6	11	3.7	150	3.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SS	105	4.4	2280	3.6	16	2.8	180	1.9	4	1.3	60	1.3	0	0.0	0	0.0	1	6.7	60	10.2	0	0.0	0	0.0
WT	3	0.1	120	0.2	6	1.0	240	2.5	4	1.3	110	2.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
OO	272	11.4	6400	10.2	91	15.8	2100	22.0	49	16.3	1060	23.8	3	21.4	70	17.1	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL	2392		62680		577		9550		301		4460		14		410		15		590		20		690	

	PRODUCT 1	PRODUCT 2	PRODUCT 3	PRODUCTS 1,2,&3	PRODUCTS 1&2	PRODUCTS 1&3
AA=	2112	1395	760	24	47	35
BB=	1481	478	254	11	14	20
CC=	79.59	34.27	33.42	45.83	29.79	57.14
DD=	45.82	30.27	16.49	0.52	1.02	0.76
EE=	242668	77000	34054	3468	6026	5371
FF=	25.83	12.40	13.10	11.82	9.79	12.85
GG=	63.17	20.04	8.86	0.90	1.57	1.40
HH=	78.80	12.01	5.61	0.52	0.74	0.87

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC SOLID UNREPS FOR THIS PRODUCT
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC SOLID ALONGSIDE TIME FOR THIS PRODUCT
HH=PC SOLID DELAY TIME SPENT BY DELAYS FOR THIS PRODUCT

PRODUCT 1=AMMUNITION/ORDNANCE
PRODUCT 2=PROVISIONS
PRODUCT 3=GENERAL STORES

TABLE LXXVII-CONTINUED

PRODUCTS 2&3

DLY CODE	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	5	8.5	70	6.0
AR	3	5.1	40	3.4
BO	1	1.7	20	1.7
BT	2	3.4	120	10.3
ET	1	1.7	30	2.6
MT	2	3.4	20	1.7
NA	1	1.7	10	0.9
NL	0	0.0	0	0.0
NR	7	11.9	100	8.6
PT	4	6.8	80	6.9
RC	7	11.9	160	13.8
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	4	6.8	60	5.2
SS	6	10.2	60	5.2
WT	1	1.7	40	3.4
OO	15	25.4	350	30.2
TOTAL	59		1160	

AA=	236
BB=	44
CC=	18.64
DD=	5.12
EE=	15556
FF=	7.46
GG=	4.05
HH=	1.46

TABLE LXXVIII

PRODUCT DELAY ANALYSIS FOR LIQUID CARGO

DLY CODE	PRODUCT 1 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCT 1 DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCT 2 DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCT 3 DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1,2,&3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCTS 1,2,&3 DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1&2 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCTS 1&2 DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1&3 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	PRODUCTS 1&3 DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	125	4.3	2180	2.8	26	2.9	650	3.4	0	0.0	0	0.0	1	1.8	30	2.0	9	2.5	110	1.3	1	4.3	10	1.6
AR	133	4.5	2450	3.2	82	9.0	1770	9.3	0	0.0	0	0.0	3	5.3	90	5.9	18	5.6	370	4.4	3	13.0	130	20.6
BT	813	27.7	32320	41.7	22	2.4	600	3.2	1	16.7	10	9.1	9	15.8	230	15.1	57	17.6	2090	25.0	0	0.0	0	0.0
HC	64	2.2	1480	1.9	14	1.5	260	1.4	0	0.0	0	0.0	1	1.8	80	5.3	20	6.2	570	6.8	0	0.0	0	0.0
MT	116	3.9	1380	1.8	61	6.7	670	3.5	0	0.0	0	0.0	1	1.8	10	0.7	4	1.2	60	0.7	0	0.0	0	0.0
NA	13	0.4	550	0.7	8	0.9	260	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
PT	458	15.6	9500	12.3	136	15.0	2340	12.3	1	16.7	50	45.5	5	9.8	170	11.2	35	10.8	750	9.0	4	17.4	60	9.5
PC	187	6.4	4670	6.0	50	5.5	1340	7.1	0	0.0	0	0.0	6	10.5	100	6.6	38	11.7	1040	12.4	2	8.7	40	6.3
RS	23	0.8	250	0.3	8	0.9	90	0.5	0	0.0	0	0.0	0	0.0	0	0.0	3	0.9	30	0.4	0	0.0	0	0.0
SO	13	0.4	280	0.4	1	0.1	40	0.2	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	10	0.1	0	0.0	0	0.0
SK	186	6.3	2510	3.2	56	6.2	800	4.2	0	0.0	0	0.0	2	3.5	20	1.3	18	5.6	270	3.2	2	8.7	20	3.2
VT	7	0.2	110	0.1	2	0.2	50	0.3	0	0.0	0	0.0	2	3.5	60	3.9	20	6.2	290	3.5	0	0.0	0	0.0
WT	58	2.0	2180	2.8	115	12.7	2750	14.6	0	0.0	0	0.0	4	7.0	80	5.3	4	1.2	130	1.6	0	0.0	0	0.0
OO	744	25.3	17600	22.7	326	35.9	7330	38.7	4	66.7	50	45.5	23	40.4	650	42.8	98	30.2	2650	31.7	11	47.8	370	58.7
TOTAL	2940		77460		907		18960		6		110		57		1520		324		8370		23		630	
	AA=	6233			AA=	1299			AA=	5			AA=	126			AA=	734			AA=	47		
	BB=	2265			BB=	682			BB=	3			BB=	44			BB=	230			BB=	19		
	CC=	36.34			CC=	52.50			CC=	60.00			CC=	34.92			CC=	31.34			CC=	40.43		
	DD=	73.76			DD=	15.37			DD=	0.06			DD=	1.49			DD=	8.69			DD=	0.56		
	EE=	431147			EE=	86024			EE=	765			EE=	16531			EE=	95291			EE=	6206		
	FF=	17.97			FF=	22.04			FF=	14.38			FF=	9.19			FF=	8.69			FF=	10.15		
	GG=	67.58			GG=	13.48			GG=	0.12			GG=	2.59			GG=	15.09			GG=	0.97		
	HH=	72.26			HH=	17.69			HH=	0.10			HH=	1.42			HH=	7.81			HH=	0.59		

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC LIQUID UNREPS FOR THIS PRODUCT
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC LIQUID ALONGSIDE TIME FOR THIS PRODUCT
HH=PC LIQUID DELAY TIME SPENT BY DELAYS FOR THIS PRODUCT

PRODUCT 1=NSFO
PRODUCT 2=JP-5
PRODUCT 3=AVGAS

TABLE LXXVIII-CONTINUED

PRODUCTS 2&3

DLY CODE	NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	0	0.0	0	0.0
AR	0	0.0	0	0.0
BT	0	0.0	0	0.0
HC	0	0.0	0	0.0
MT	0	0.0	0	0.0
NA	0	0.0	0	0.0
PT	0	0.0	0	0.0
RC	2	33.3	20	14.3
RS	0	0.0	0	0.0
SD	0	0.0	0	0.0
SK	0	0.0	0	0.0
VT	2	33.3	50	35.7
WT	0	0.0	0	0.0
00	2	33.3	70	50.0
TOTAL	6		140	

AA=	6
BB=	4
CC=	66.67
DD=	0.07
EE=	984
FF=	14.23
GG=	0.15
HH=	0.13

TABLE LXXIX

PRODUCT DELAY ANALYSIS FOR VERTREP CARGO

DLY CODE	PRODUCT 1 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 2 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCT 3 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1,2,&3 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 1&2 OR 1&3 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	PRODUCTS 2&3 NO OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	1	1.4	5	0.4	2	2.7	25	2.2	2	3.1	70	8.1	0	0.0	0	0.0	0	0.0	0	0.0	10	2.7	125	2.6
AA	1	1.4	40	3.4	8	10.7	125	11.1	1	1.6	5	0.6	2	4.9	60	7.4	7	10.8	130	10.7	18	4.8	265	5.6
BB	3	4.1	75	6.3	6	8.0	80	7.1	4	6.3	30	3.5	1	2.4	15	1.9	7	10.8	125	10.2	27	7.2	370	7.8
LA	1	1.4	5	0.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	1.3	35	0.7
MT	0	0.0	0	0.0	5	6.7	70	6.2	5	7.8	90	10.5	1	2.4	5	0.6	0	0.0	0	0.0	10	2.7	65	1.4
NI	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
MB	17	23.4	345	29.0	26	34.7	415	36.9	33	51.6	365	42.4	9	22.0	230	28.4	15	23.1	415	34.0	171	45.5	2220	46.6
DT	20	27.4	195	16.4	8	10.7	155	13.8	3	4.7	20	2.3	8	19.5	90	11.1	9	12.3	105	8.6	25	6.6	160	3.4
AS	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SS	14	19.2	205	17.2	2	2.7	15	1.3	2	3.1	25	2.9	5	12.2	105	13.0	10	15.4	150	12.3	18	4.8	185	3.9
OT	16	21.9	320	26.9	18	24.0	240	21.3	14	21.9	255	29.7	15	36.6	305	37.7	13	27.7	295	24.2	92	24.5	1335	28.0
TOTAL	73		1190		75		1125		64		860		41		810		65		1220		376		4760	

	AA=	32			AA=	110			AA=	121			AA=	30			AA=	43			AA=	516		
	BB=	40			BB=	48			BB=	46			BB=	23			BB=	31			BB=	236		
	CC=	59.76			CC=	43.64			CC=	38.02			CC=	76.67			CC=	72.09			CC=	45.74		
	DD=	3.09			DD=	12.20			DD=	13.41			DD=	3.33			DD=	4.77			DD=	57.21		
	EE=	8117			EE=	5225			EE=	3299			EE=	5086			EE=	6541			EE=	25197		
	FF=	14.56			FF=	21.53			FF=	26.07			FF=	15.93			FF=	18.65			FF=	18.89		
	GG=	15.18			GG=	9.77			GG=	6.17			GG=	9.51			GG=	12.23			GG=	47.13		
	HH=	11.04			HH=	11.29			HH=	8.63			HH=	8.13			HH=	12.24			HH=	47.77		

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC VERTREP UNREPS FOR THIS PRODUCT
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC VERTREP ALONGSIDE TIME FOR THIS PRODUCT
HH=PC VERTREP DELAY TIME SPENT BY DELAYS FOR THIS PRODUCT

PRODUCT 1=AMMUNITION/ORDNANCE
PRODUCT 2=PROVISIONS
PRODUCT 3=GENERAL STORES

TABLE LXXX

MONTH OF DEPLOYMENT DELAY ANALYSIS FOR SOLID CARGO:AE 3/12

DLY CODE	MONTH 1 NO. OF DLY	MONTH 1 PC TOTAL DLY OF THIS TYPE	MONTH 1 DLY TIME	MONTH 1 PC DLY TIME DUE TO THIS DLY	MONTH 2 NO. OF DLY	MONTH 2 PC TOTAL DLY OF THIS TYPE	MONTH 2 DLY TIME	MONTH 2 PC DLY TIME DUE TO THIS DLY	MONTH 3 NO. OF DLY	MONTH 3 PC TOTAL DLY OF THIS TYPE	MONTH 3 DLY TIME	MONTH 3 PC DLY TIME DUE TO THIS DLY	MONTH 4 NO. OF DLY	MONTH 4 PC TOTAL DLY OF THIS TYPE	MONTH 4 DLY TIME	MONTH 4 PC DLY TIME DUE TO THIS DLY	MONTH 5 NO. OF DLY	MONTH 5 PC TOTAL DLY OF THIS TYPE	MONTH 5 DLY TIME	MONTH 5 PC DLY TIME DUE TO THIS DLY	MONTH 6 NO. OF DLY	MONTH 6 PC TOTAL DLY OF THIS TYPE	MONTH 6 DLY TIME	MONTH 6 PC DLY TIME DUE TO THIS DLY
AW	1	0.7	20	0.5	7	3.5	90	1.8	16	6.2	660	9.7	8	3.1	230	3.4	27	8.1	600	6.6	5	1.9	60	1.0
AR	2	1.4	80	2.0	4	2.0	50	1.0	3	1.2	30	0.4	3	1.2	60	0.9	6	1.8	140	1.5	3	1.1	50	0.8
BO	4	2.8	110	2.8	3	1.5	80	1.6	7	2.7	180	2.7	3	1.2	160	2.4	6	1.8	140	1.5	1	0.4	80	1.3
BT	91	63.2	2640	67.3	105	52.5	3200	65.4	120	46.7	3200	47.2	127	50.0	3750	55.2	168	50.3	5120	56.2	129	48.3	3730	60.1
ET	1	0.7	50	1.3	1	0.5	30	0.6	1	0.4	60	0.9	2	0.8	70	1.0	0	0.0	0	0.0	0	0.0	0	0.0
MT	1	0.7	10	0.3	4	2.0	60	1.2	2	0.8	30	0.4	7	2.8	100	1.5	2	0.6	20	0.2	10	3.7	110	1.8
NA	1	0.7	20	0.5	2	1.0	30	0.6	0	0.0	0	0.0	0	0.0	0	0.0	2	0.6	20	0.2	1	0.4	10	0.2
NL	1	0.7	10	0.3	2	1.0	20	0.4	6	2.3	70	1.0	3	1.2	40	0.6	1	0.3	10	0.1	0	0.0	0	0.0
NR	0	0.0	0	0.0	2	1.0	20	0.4	3	1.2	30	0.4	2	0.8	20	0.3	3	0.9	30	0.3	8	3.0	80	1.3
PT	6	4.2	90	2.3	13	6.5	270	5.5	19	7.4	500	7.4	17	6.7	440	6.5	14	4.2	390	4.3	27	10.1	600	9.7
RC	16	11.1	420	10.7	23	11.5	410	8.4	38	14.8	1070	15.8	21	8.3	510	7.5	40	12.0	1110	12.2	21	7.9	380	6.1
RS	2	1.4	30	0.8	1	0.5	10	0.2	1	0.4	10	0.1	1	0.4	20	0.3	2	0.6	20	0.2	1	0.4	20	0.3
SD	1	0.7	10	0.3	1	0.5	10	0.2	1	0.4	10	0.1	1	0.4	20	0.3	0	0.0	0	0.0	2	0.7	30	0.5
SK	4	2.8	50	1.3	9	4.5	90	1.8	6	2.3	70	1.0	6	2.4	70	1.0	17	5.1	280	3.1	11	4.1	130	2.1
SS	0	0.0	0	0.0	13	6.5	260	5.3	5	1.9	160	2.4	13	5.1	280	4.1	24	7.2	680	7.5	23	8.6	420	6.8
WT	0	0.0	0	0.0	0	0.0	0	0.0	1	0.4	60	0.9	1	0.4	50	0.7	0	0.0	0	0.0	0	0.0	0	0.0
OO	13	9.0	380	9.7	10	5.0	260	5.3	28	10.9	640	9.4	39	15.4	970	14.3	22	6.6	550	6.0	25	9.4	510	8.2
TOTAL	144		3920		200		4890		257		6780		254		6790		334		9110		267		6210	
	AA=	131			AA=	148			AA=	197			AA=	190			AA=	269			AA=	178		
	BB=	107			BB=	127			BB=	167			BB=	168			BB=	230			BB=	151		
	CC=	81.68			CC=	85.81			CC=	84.77			CC=	88.42			CC=	85.50			CC=	84.83		
	DD=	10.60			DD=	11.97			DD=	15.94			DD=	15.37			DD=	21.76			DD=	14.40		
	EE=	15302			EE=	17171			EE=	24113			EE=	22609			EE=	31217			EE=	19621		
	FF=	25.62			FF=	28.48			FF=	28.12			FF=	30.03			FF=	29.18			FF=	31.65		
	GG=	10.63			GG=	11.92			GG=	16.75			GG=	15.70			GG=	21.68			GG=	13.63		
	HH=	9.42			HH=	11.75			HH=	16.29			HH=	16.31			HH=	21.89			HH=	14.92		

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC SOLID UNREPS THIS MONTH
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC SOLID ALONGSIDE TIME THIS MONTH
HH=PC SOLID DELAY TIME SPENT BY DELAYS THIS MONTH

TABLE LXXX-CONTINUED

DLY CODE	MONTH 7 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	MONTH 8 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY	MONTH 9 NO. OF DLY	PC TOTAL DLY OF THIS TYPE	DLY TIME	PC DLY TIME DUE TO THIS DLY
AW	14	9.6	360	9.4	0	0.0	0	0.0	0	0.0	0	0.0
AR	2	1.4	60	1.6	0	0.0	0	0.0	0	0.0	0	0.0
BO	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
BT	74	50.7	2430	63.4	2	66.7	70	77.8	0	0.0	0	0.0
ET	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
MT	2	1.4	20	0.5	0	0.0	0	0.0	0	0.0	0	0.0
NA	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NL	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
NR	1	0.7	10	0.3	0	0.0	0	0.0	0	0.0	0	0.0
PT	6	4.1	140	3.7	1	33.3	20	22.2	0	0.0	0	0.0
RC	13	8.9	270	7.0	0	0.0	0	0.0	0	0.0	0	0.0
RS	1	0.7	10	0.3	0	0.0	0	0.0	0	0.0	0	0.0
SD	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SK	7	4.8	80	2.1	0	0.0	0	0.0	0	0.0	0	0.0
SS	14	9.6	190	5.0	0	0.0	0	0.0	0	0.0	0	0.0
WT	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
OO	12	8.2	260	6.8	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL	146		3830		3		90		0		0	

AA=	121	AA=	2
BB=	98	BB=	2
CC=	80.99	CC=	100.00
DD=	9.79	DD=	0.16
EE=	13807	EE=	155
FF=	27.74	FF=	58.06
GG=	9.59	GG=	0.11
HH=	9.20	HH=	0.22

AA=	0
BB=	0
CC=	0.0
DD=	0.0
EE=	0
FF=	0.0
GG=	0.0
HH=	0.0

TABLE LXXXI

MONTHLY DELAY ANALYSIS FOR LIQUID CARGO
WESTPAC CALENDER YEAR 1968

DLY CODE	JANUARY NO. OF DLY	JANUARY PC TOTAL DLY OF THIS TYPE	JANUARY DLY TIME	JANUARY PC DLY TIME DUE TO THIS DLY	FEBRUARY NO. OF DLY	FEBRUARY PC TOTAL DLY OF THIS TYPE	FEBRUARY DLY TIME	FEBRUARY PC DLY TIME DUE TO THIS DLY	MARCH NO. OF DLY	MARCH PC TOTAL DLY OF THIS TYPE	MARCH DLY TIME	MARCH PC DLY TIME DUE TO THIS DLY	APRIL NO. OF DLY	APRIL PC TOTAL DLY OF THIS TYPE	APRIL DLY TIME	APRIL PC DLY TIME DUE TO THIS DLY	MAY NO. OF DLY	MAY PC TOTAL DLY OF THIS TYPE	MAY DLY TIME	MAY PC DLY TIME DUE TO THIS DLY	JUNE NO. OF DLY	JUNE PC TOTAL DLY OF THIS TYPE	JUNE DLY TIME	JUNE PC DLY TIME DUE TO THIS DLY
AW	14	6.7	180	3.6	8	3.1	80	1.2	2	0.9	30	0.5	5	2.0	70	1.1	0	0.0	0	0.0	0	0.0	0	0.0
AR	15	7.2	360	7.2	15	5.8	300	4.4	13	5.6	410	6.7	8	3.3	140	2.1	14	4.9	350	4.8	21	8.2	420	6.2
BT	35	16.7	1020	20.5	59	22.7	2610	38.1	66	28.4	2870	47.0	75	30.7	3140	47.6	85	29.7	2920	40.2	70	27.2	3020	44.4
HC	4	1.9	130	2.6	9	3.5	190	2.8	4	1.7	80	1.3	6	2.5	90	1.4	5	1.7	70	1.0	8	3.1	200	2.9
MT	8	3.8	90	1.8	7	2.7	90	1.3	13	5.6	140	2.3	2	0.8	20	0.3	10	3.5	110	1.5	12	4.7	150	2.2
NA	2	1.0	120	2.4	0	0.0	0	0.0	1	0.4	10	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
PT	24	11.5	450	9.1	33	12.7	690	10.1	34	14.7	670	11.0	42	17.2	760	11.5	62	21.7	1320	18.2	33	12.8	570	8.4
RC	18	8.6	490	9.9	23	8.8	670	9.8	14	6.0	280	4.6	21	8.6	510	7.7	20	7.0	550	7.6	16	6.2	390	5.7
RS	3	1.4	30	0.6	1	0.4	10	0.1	5	2.2	50	0.8	2	0.8	20	0.3	2	0.7	20	0.3	5	1.9	60	0.9
SD	0	0.0	0	0.0	1	0.4	30	0.4	0	0.0	0	0.0	2	0.8	40	0.6	0	0.0	0	0.0	1	0.4	10	0.1
SK	13	6.2	160	3.2	34	13.1	440	6.4	15	6.5	200	3.3	12	4.9	200	3.0	12	4.2	260	3.6	5	1.9	50	0.7
VT	3	1.4	70	1.4	2	0.8	20	0.3	1	0.4	10	0.2	0	0.0	0	0.0	4	1.4	60	0.8	6	2.3	120	1.8
WT	3	1.4	60	1.2	2	0.8	30	0.4	3	1.3	50	0.8	7	2.9	160	2.4	14	4.9	280	3.9	14	5.4	410	6.0
OO	67	32.1	1800	36.2	66	25.4	1490	24.7	61	26.3	1310	21.4	62	25.4	1440	21.9	58	20.3	1320	18.2	66	25.7	1400	20.6
TOTAL	209		4970		260		6850		232		6110		244		6590		286		7260		257		6800	
	AA=		456		AA=		509		AA=		511		AA=		490		AA=		510		AA=		493	
	BB=		163		BB=		200		BB=		178		BB=		176		BB=		235		BB=		204	
	CC=		37.06		CC=		39.29		CC=		34.83		CC=		35.92		CC=		46.08		CC=		41.38	
	DD=		8.01		DD=		8.04		DD=		8.97		DD=		8.60		DD=		8.95		DD=		8.66	
	EE=		36844		EE=		40200		EE=		35221		EE=		35823		EE=		34610		EE=		35756	
	FF=		13.49		FF=		17.04		FF=		17.35		FF=		18.40		FF=		20.98		FF=		19.02	
	GG=		8.59		GG=		9.38		GG=		8.21		GG=		8.36		GG=		8.07		GG=		8.34	
	HH=		6.60		HH=		9.10		HH=		8.12		HH=		8.75		HH=		9.64		HH=		9.03	

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC LIQUID UNREPS THIS MONTH
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC LIQUID ALONGSIDE TIME THIS MONTH
HH=PC LIQUID DELAY TIME SPENT BY DELAYS THIS MONTH

TABLE LXXXI-CONTINUED

MONTHLY DELAY ANALYSIS FOR LIQUID CARGO
WESTPAC CALENDER YEAR 1968

DLY CODE	JULY NO. OF DLY	JULY PC TOTAL DLY OF THIS TYPE	JULY DLY TIME	JULY PC DLY TIME DUE TO THIS DLY	AUGUST NO. OF DLY	AUGUST PC TOTAL DLY OF THIS TYPE	AUGUST DLY TIME	AUGUST PC DLY TIME DUE TO THIS DLY	SEPTEMBER NO. OF DLY	SEPTEMBER PC TOTAL DLY OF THIS TYPE	SEPTEMBER DLY TIME	SEPTEMBER PC DLY TIME DUE TO THIS DLY	OCTOBER NO. OF DLY	OCTOBER PC TOTAL DLY OF THIS TYPE	OCTOBER DLY TIME	OCTOBER PC DLY TIME DUE TO THIS DLY	NOVEMBER NO. OF DLY	NOVEMBER PC TOTAL DLY OF THIS TYPE	NOVEMBER DLY TIME	NOVEMBER PC DLY TIME DUE TO THIS DLY	DECEMBER NO. OF DLY	DECEMBER PC TOTAL DLY OF THIS TYPE	DECEMBER DLY TIME	DECEMBER PC DLY TIME DUE TO THIS DLY
AW	4	1.9	120	1.8	3	1.4	40	0.7	14	5.9	380	5.3	4	2.2	70	1.2	7	3.6	90	1.9	3	1.0	30	0.5
AR	14	6.6	310	4.8	28	12.7	610	10.6	25	10.5	530	7.4	10	5.4	250	4.3	12	6.2	140	2.9	12	4.1	200	3.1
BT	55	25.9	2410	37.0	60	27.3	2140	37.2	67	28.0	2690	37.4	57	30.6	2390	40.7	35	18.1	1410	29.0	56	19.2	2020	31.0
HC	7	3.3	200	3.1	2	0.9	20	0.3	9	3.8	230	3.2	5	2.7	190	3.2	4	2.1	90	1.9	4	1.4	50	0.8
MT	8	3.8	100	1.5	2	0.9	20	0.3	12	5.0	120	1.7	8	4.3	90	1.5	5	2.6	70	1.4	6	2.1	60	0.9
NA	2	0.9	70	1.1	1	0.5	30	0.5	3	1.3	90	1.3	2	1.1	70	1.2	4	2.1	180	3.7	0	0.0	0	0.0
PT	42	19.8	980	15.0	45	20.5	820	14.3	35	14.6	870	12.1	26	14.0	470	8.0	37	19.2	790	16.3	34	11.7	670	10.3
RC	5	2.4	190	2.9	4	1.8	70	1.2	14	5.9	480	6.7	6	3.2	120	2.0	10	5.2	250	5.1	20	6.9	540	8.3
RS	1	0.5	10	0.2	2	0.9	30	0.5	1	0.4	10	0.1	0	0.0	0	0.0	1	0.5	10	0.2	1	0.3	10	0.2
SD	0	0.0	0	0.0	1	0.5	10	0.2	1	0.4	20	0.3	0	0.0	0	0.0	1	0.5	40	0.8	0	0.0	0	0.0
SK	7	3.3	100	1.5	3	1.4	80	1.4	8	3.3	110	1.5	7	3.8	140	2.4	8	4.1	120	2.5	19	6.5	240	3.7
VT	4	1.9	70	1.1	3	1.4	80	1.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3	10	0.2
WT	21	9.9	520	8.0	21	9.5	600	10.4	14	5.9	490	6.8	11	5.9	330	5.6	11	5.7	380	7.8	6	2.1	210	3.2
OO	42	19.8	1440	22.1	45	20.5	1200	20.9	36	15.1	1170	16.3	50	26.9	1750	29.8	58	30.1	1290	26.5	129	44.3	2480	38.0
TOTAL	212		6520		220		5750		239		7190		186		5870		193		4860		291		6520	
	AA=	477			AA=	467			AA=	467			AA=	441			AA=	422			AA=	453		
	BB=	164			BB=	179			BB=	190			BB=	147			BB=	142			BB=	215		
	CC=	34.38			CC=	38.33			CC=	40.69			CC=	33.33			CC=	33.65			CC=	47.46		
	DD=	8.37			DD=	8.20			DD=	8.20			DD=	7.74			DD=	7.41			DD=	7.95		
	EE=	35479			EE=	36165			EE=	36047			EE=	36163			EE=	31975			EE=	34468		
	FF=	18.38			FF=	15.90			FF=	19.95			FF=	16.23			FF=	15.20			FF=	18.92		
	GG=	8.27			GG=	8.43			GG=	8.41			GG=	8.43			GG=	7.46			GG=	8.04		
	HH=	8.66			HH=	7.64			HH=	9.55			HH=	7.80			HH=	6.46			HH=	8.66		

AA=TOTAL NO. OF UNREPS
BB=NO. OF UNREPS HAVING DELAYS
CC=PC UNREPS HAVING DELAYS
DD=PC LIQUID UNREPS THIS MONTH
EE=TOTAL ALONGSIDE TIME
FF=PC ALONGSIDE TIME SPENT IN DELAY
GG=PC LIQUID ALONGSIDE TIME THIS MONTH
HH=PC LIQUID DELAY TIME SPENT BY DELAYS THIS MONTH

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13. ABSTRACT

An operational analysis of the delays incurred in Underway Replenishments of the Pacific Fleet, December, 1967-April, 1969, is conducted. Twenty specific delays are analyzed from the UNREP data of which more than 80% was from UNREPs conducted in Southeast Asia by supply ships providing logistic support to naval units engaged in combat operations. Delay occurrence distributions are derived; delay time distributions are derived and tested for goodness-of-fit with the Kolmogorov-Smirnov test. Delay as a function of the following UNREP attributes is analyzed: supply ship class, receiver ship type, time: day or night, location: EASTPAC or WESTPAC, simultaneous receivers or a single receiver, delivery method, product delivered, length of supply ship deployment, and weather. Hypothesis testing of delay occurrence parameters for UNREP attributes is done, and causes of delays are discussed. A method, based on the use of conditional probabilities and Bayes' Theorem, of predicting a delay occurrence prior to an UNREP when the UNREP attributes are known is presented.

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Underway Replenishment						
Operational Analysis						
Replenishment At Sea						
Replenishment Delays						
Replenishment Characteristics						

Thesis
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Delay analysis of Pacific Fleet Underway Replenishments.